US009964895B2

(12) **United States Patent**
Murashima

(10) **Patent No.: US 9,964,895 B2**
(45) **Date of Patent: May 8, 2018**

(54) **TONER CONTAINER INCLUDING JOINT COUPLED WITH IMAGE FORMING APPARATUS**

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(73) Assignee: **KYOCERA Document Solutions Inc.**, Osaka-shi, Osaka (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days. days.

(21) Appl. No.: **15/393,031**

(22) Filed: **Dec. 28, 2016**

(65) **Prior Publication Data**

US 2017/0357183 A1 Dec. 14, 2017

(30) **Foreign Application Priority Data**

Jun. 8, 2016 (JP) 2016-114511

(51) **Int. Cl.**
G03G 15/08 (2006.01)
G03G 21/16 (2006.01)

(52) **U.S. Cl.**
CPC ***G03G 15/0887*** (2013.01); ***G03G 15/0865*** (2013.01); ***G03G 21/1676*** (2013.01)

(58) **Field of Classification Search**
CPC G03G 15/0887; G03G 15/0865; G03G 21/1676
See application file for complete search history.

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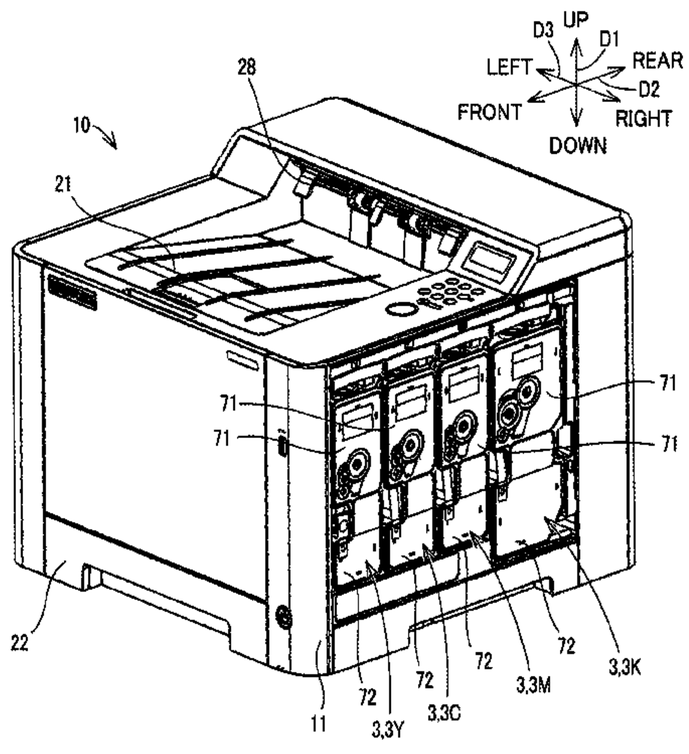
(74) *Attorney, Agent, or Firm* — Alleman Hall Creasman & Tuttle LLP

(57) **ABSTRACT**

A toner container includes a container main body, a first conveyance member rotatably provided in the container main body, a first bearing hole rotatably supports a rotation shaft of the first conveyance member in a state where the rotation shaft of the first conveyance member passes through the first bearing hole and extends outside, and a first input joint provided on an end portion of a rotation shaft of the first conveyance member in an attachment portion side, and coupled with a first drive coupling portion of the attachment portion. The first drive coupling portion includes a plurality of engaging pieces. The first input joint includes a plurality of projection pieces configured to be respectively coupled with the plurality of engaging pieces. Among the plurality of projection pieces, at least one first piece is longer than the other second piece(s) in a projection direction of the projection shaft.

6 Claims, 26 Drawing Sheets



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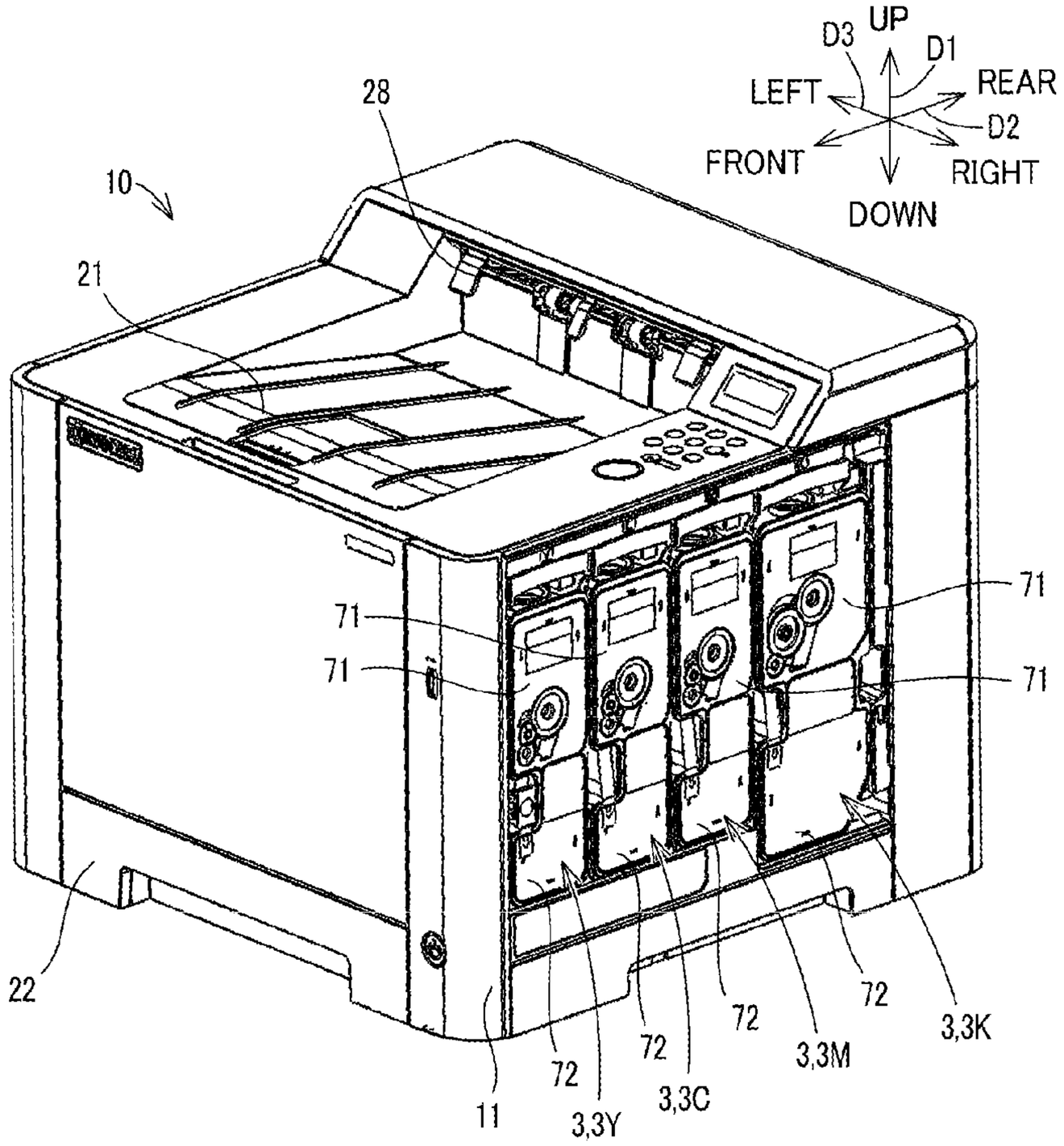
【FIG. 1】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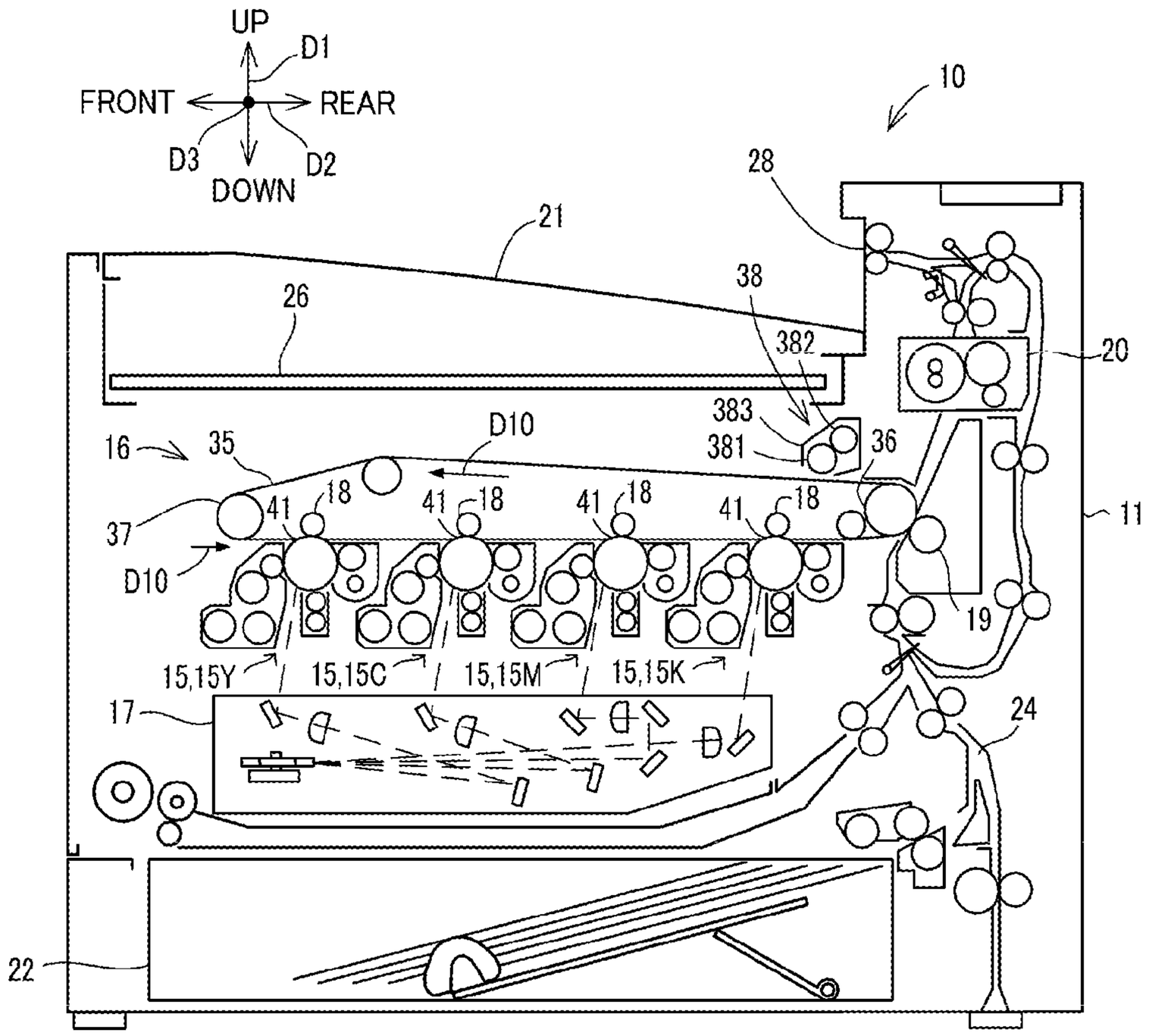
3,3Y
3,3C
3,3M
3,3K

【FIG. 2】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15,15M
15,15K
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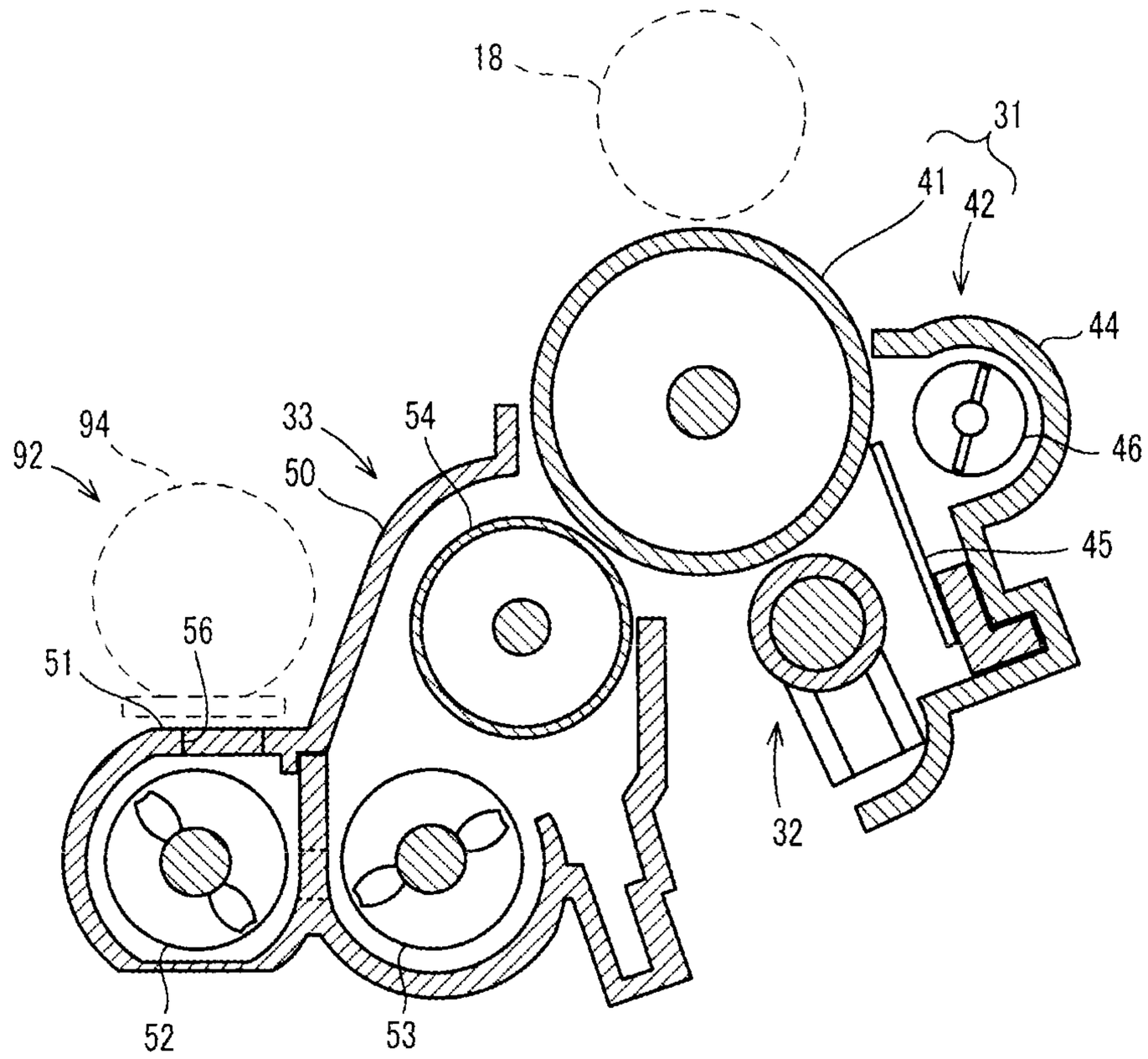
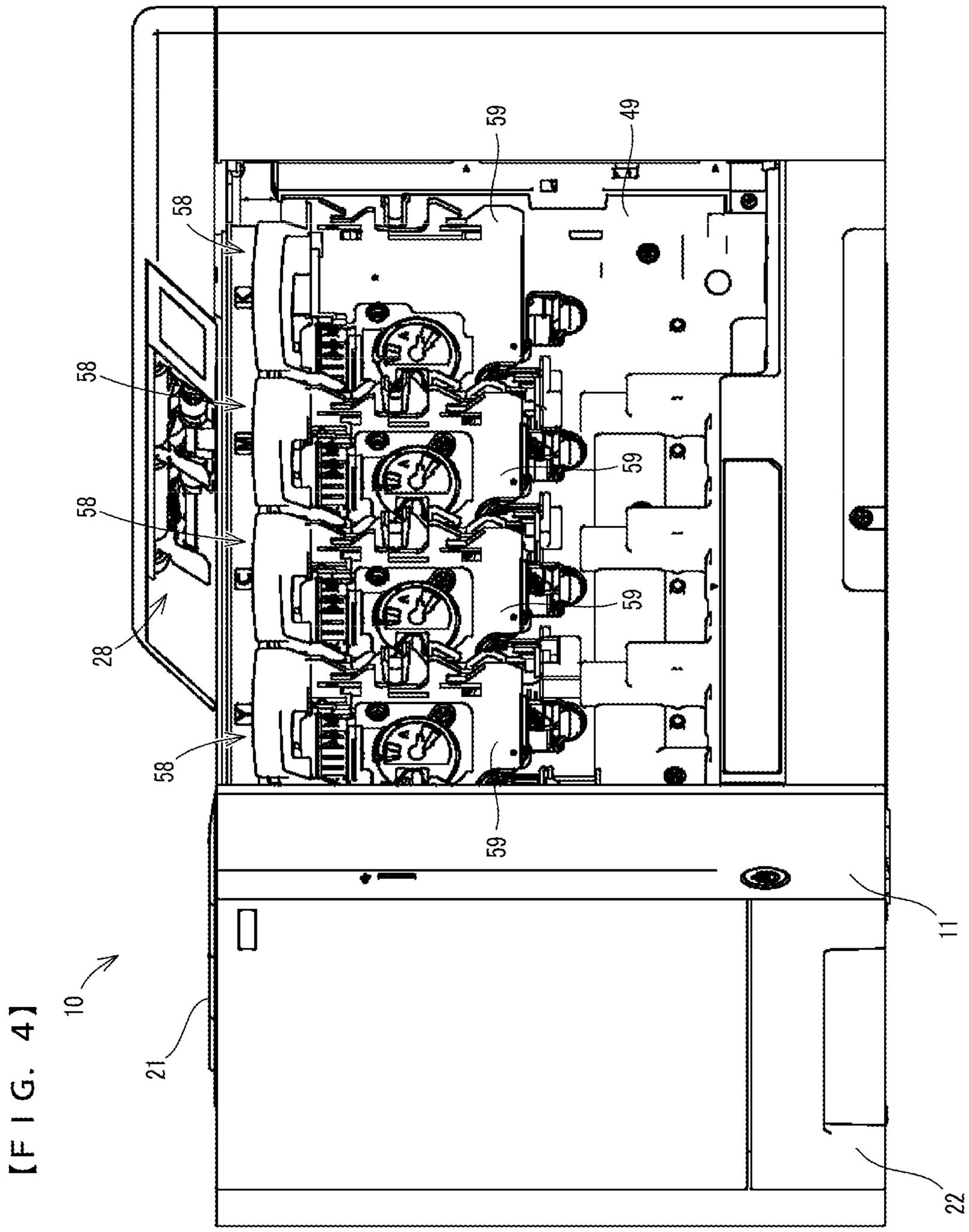
22

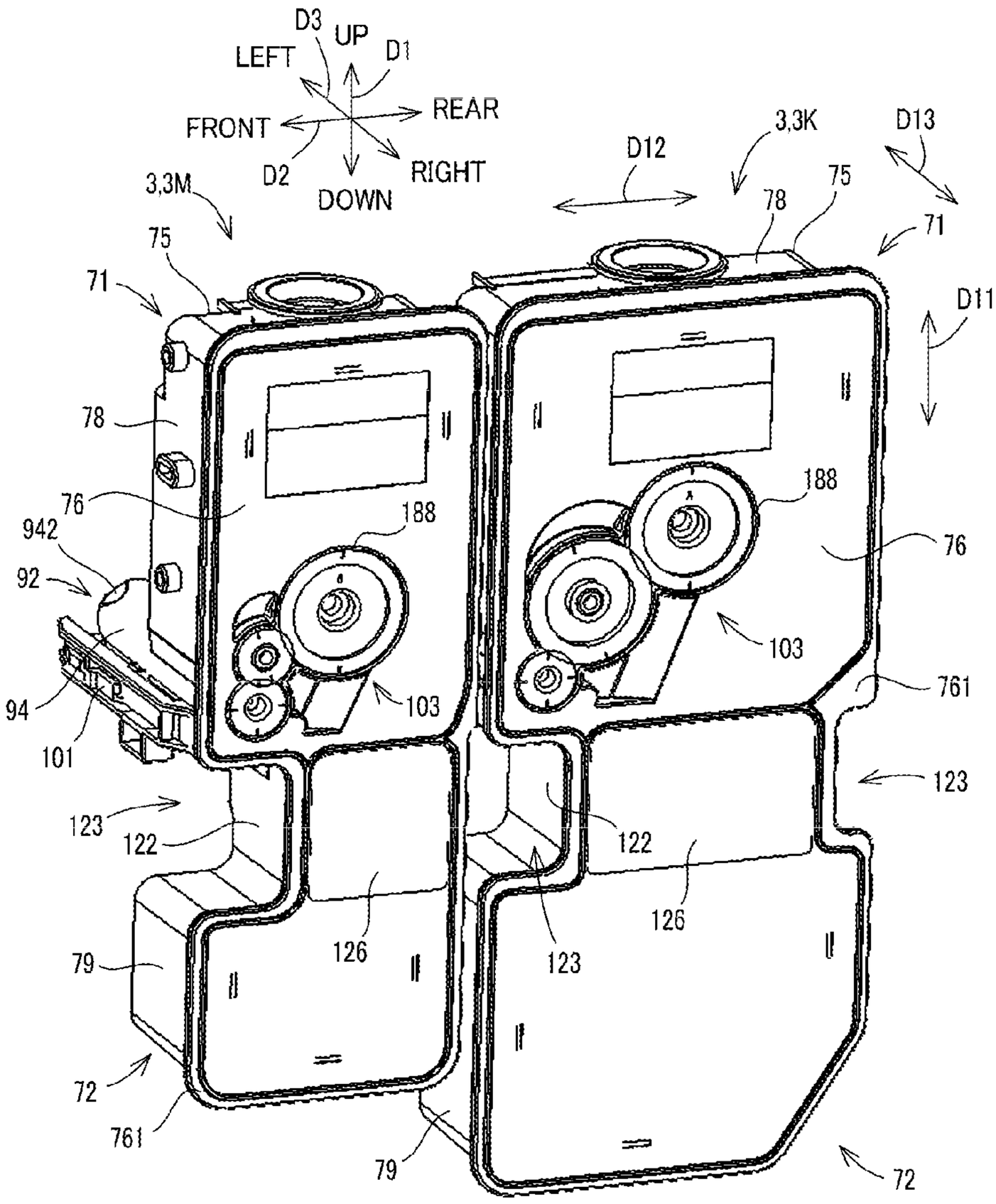
【FIG. 3】





【FIG. 4】

【FIG. 5】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3,3K
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D13
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D11
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942
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761
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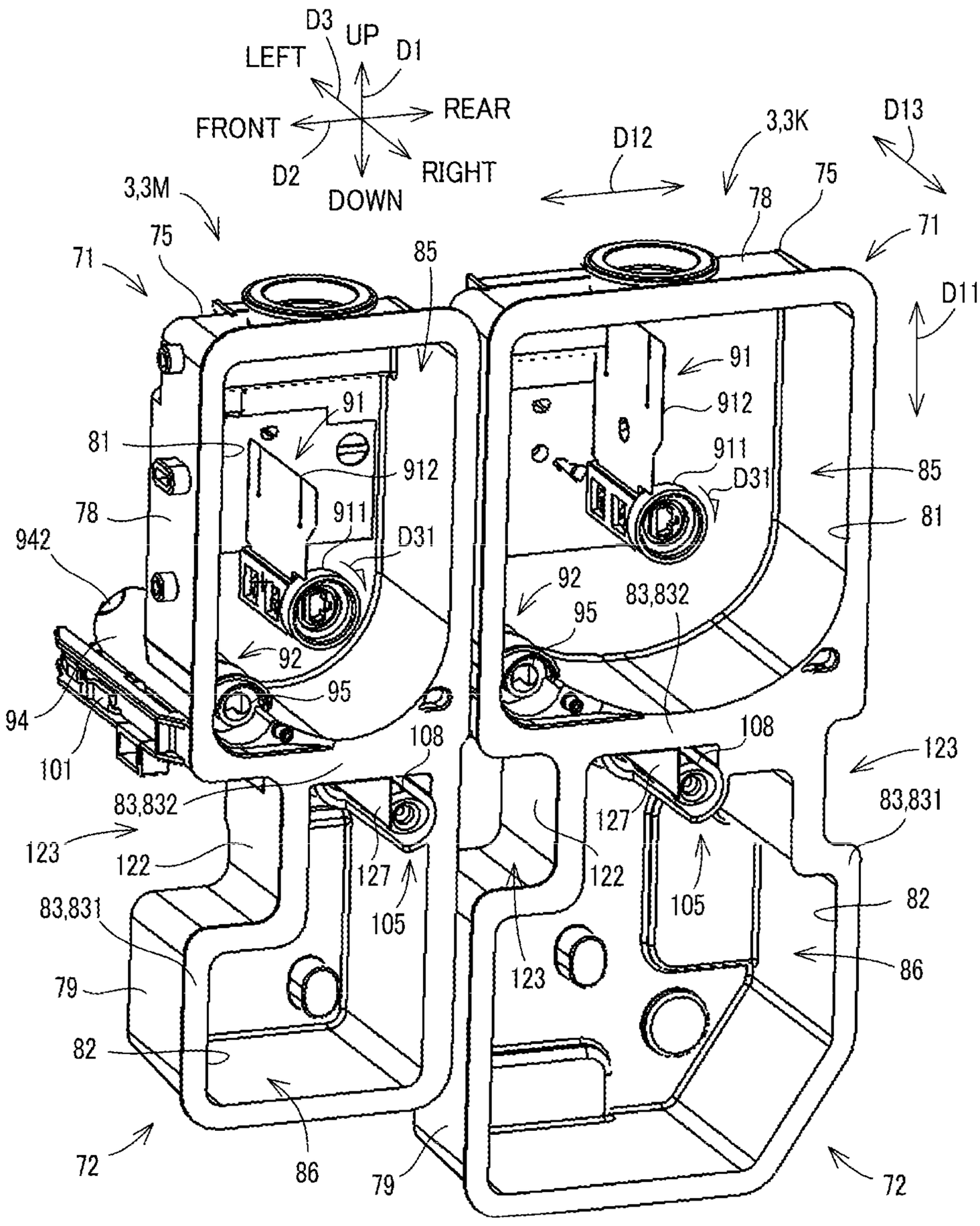
【F I G. 6】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D11
91
912
911
D31
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127
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82
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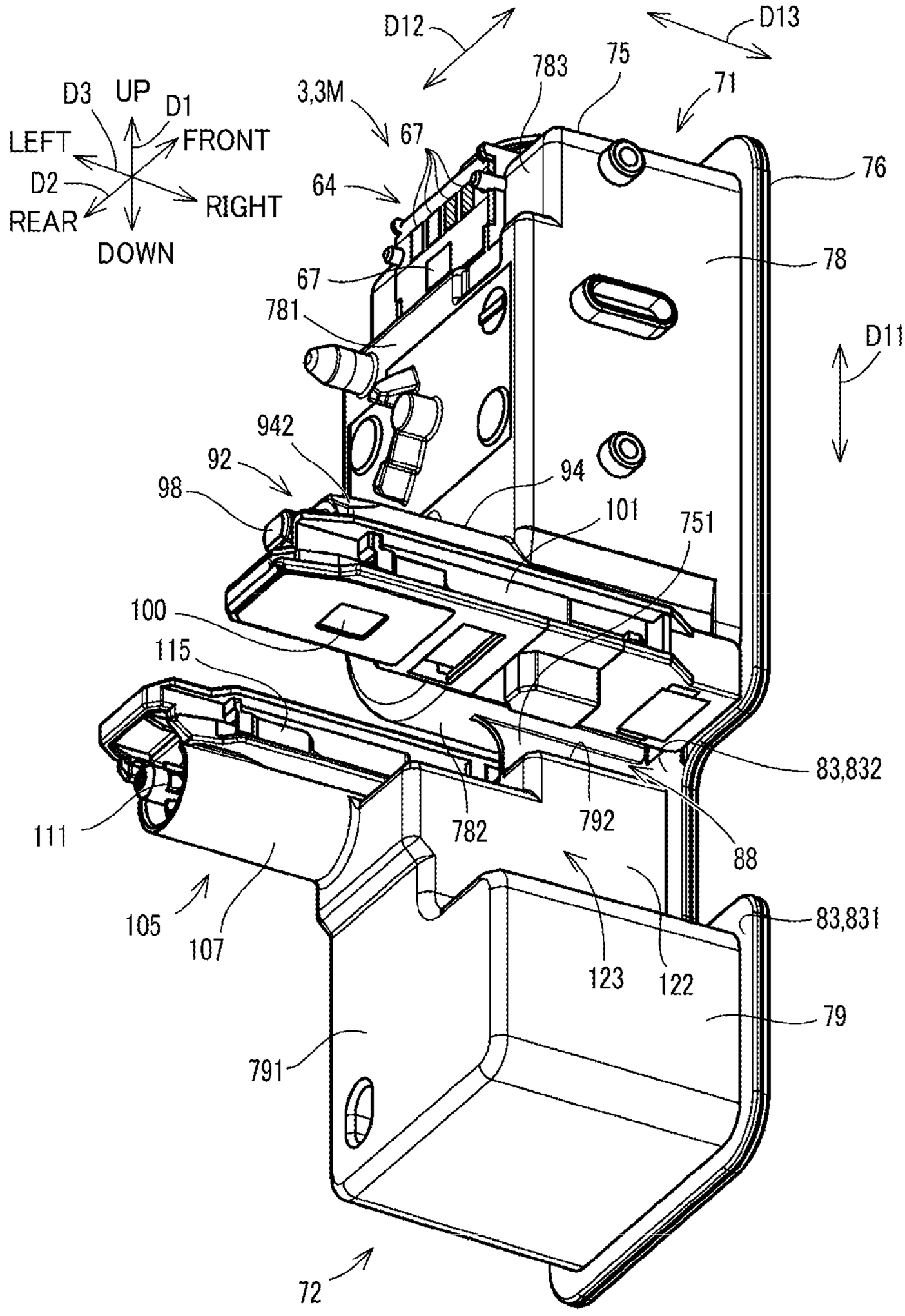
86
72

【FIG. 7】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781
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101
751
100
115
83,832
111
782
792
88
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83,831
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791
72
D3
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D2
REAR
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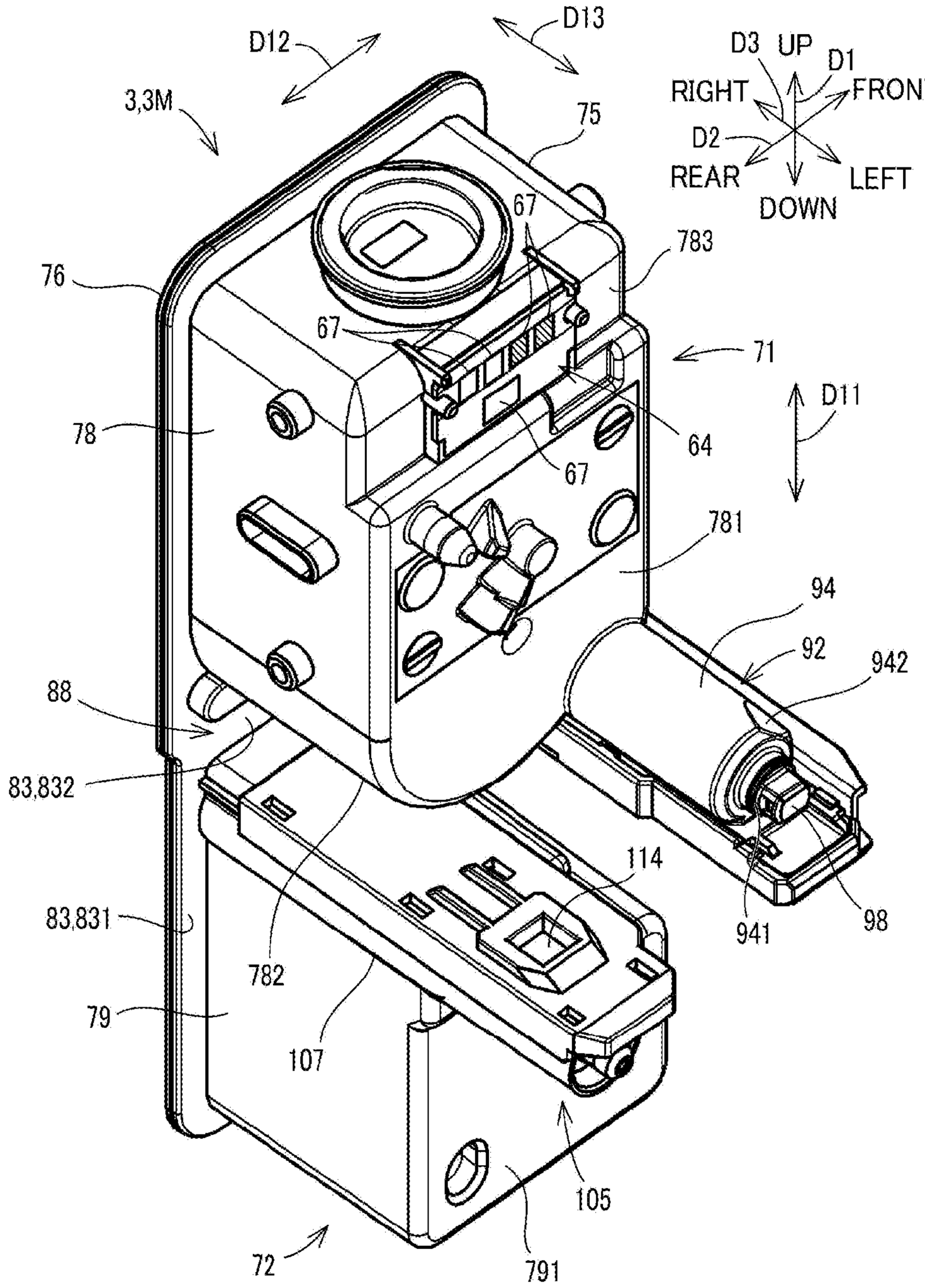
DOWN

【FIG. 8】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D13
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RIGHT
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D11
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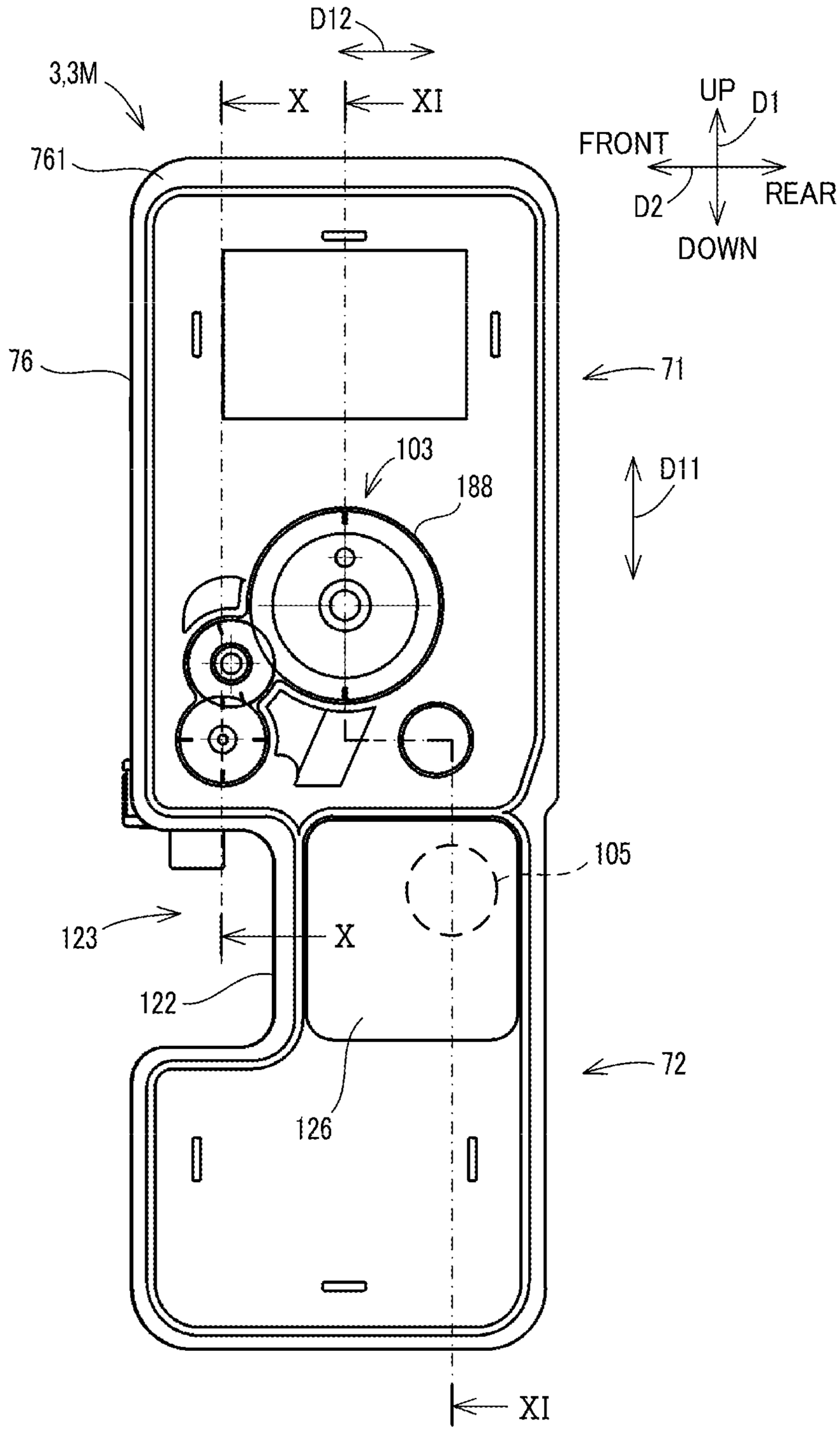
【FIG. 9】


D12
3,3M
X
XI
761
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D1
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D2
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103
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X
122
126
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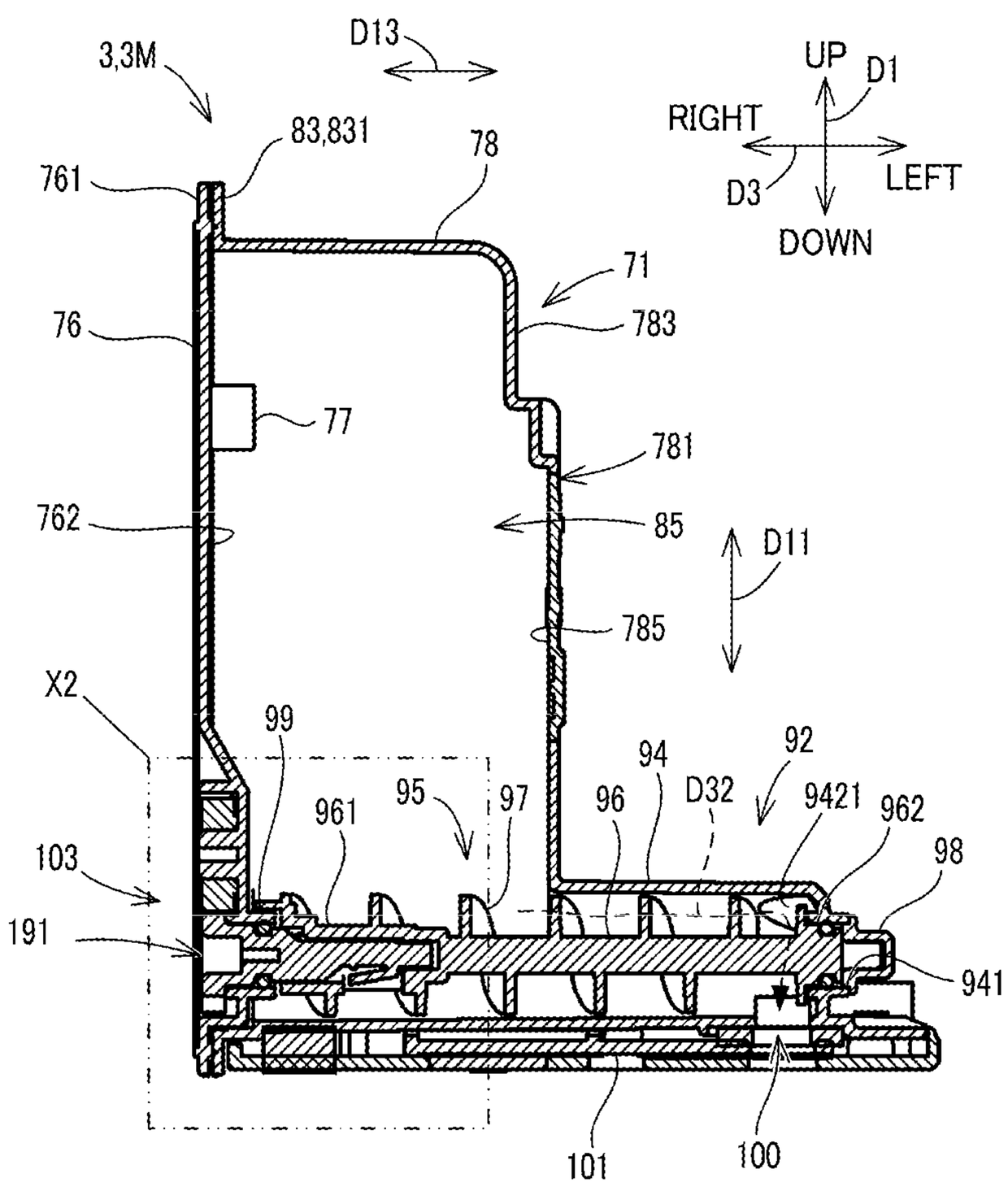
XI

【FIG. 10】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D11
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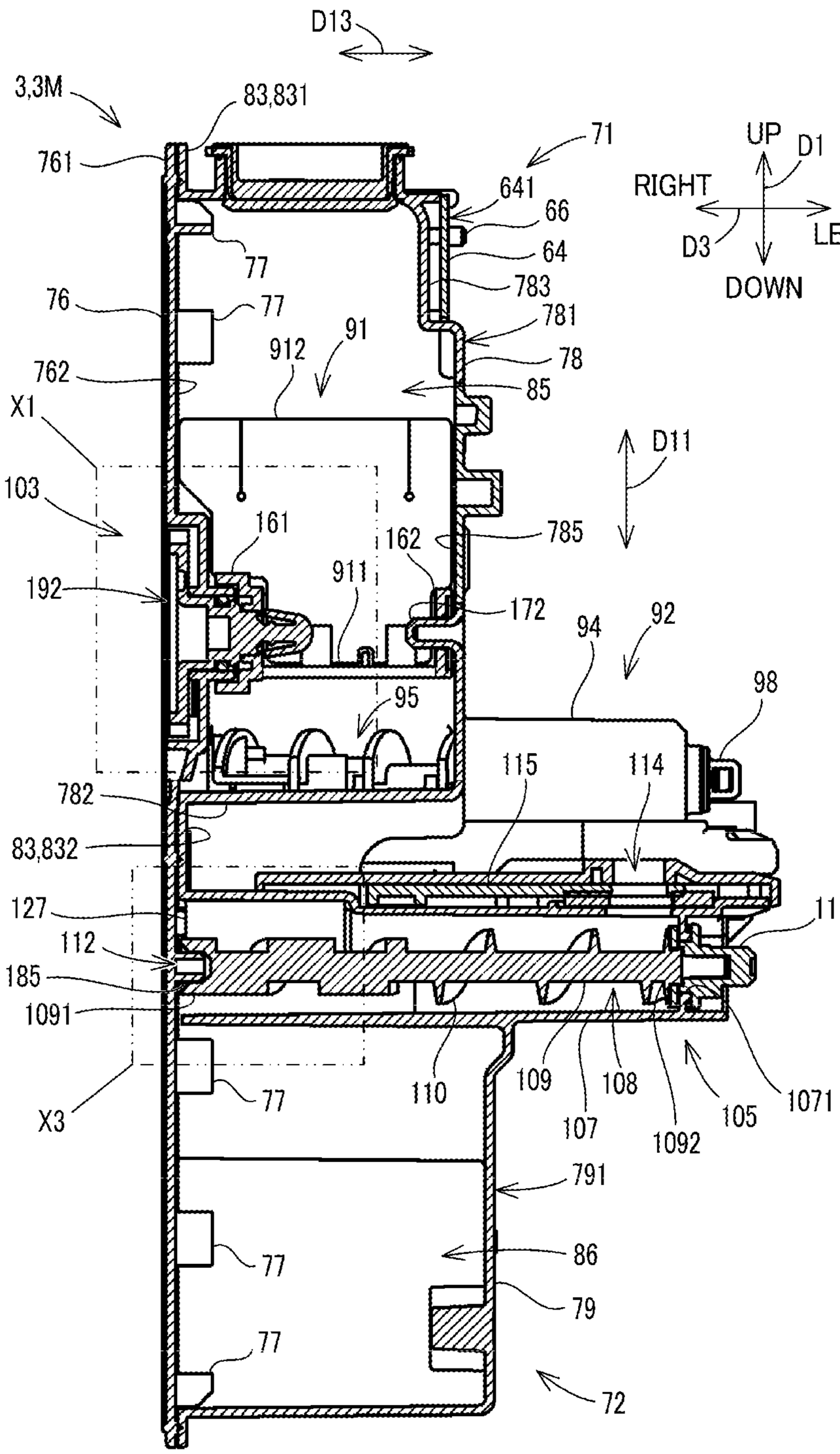
【FIG. 11】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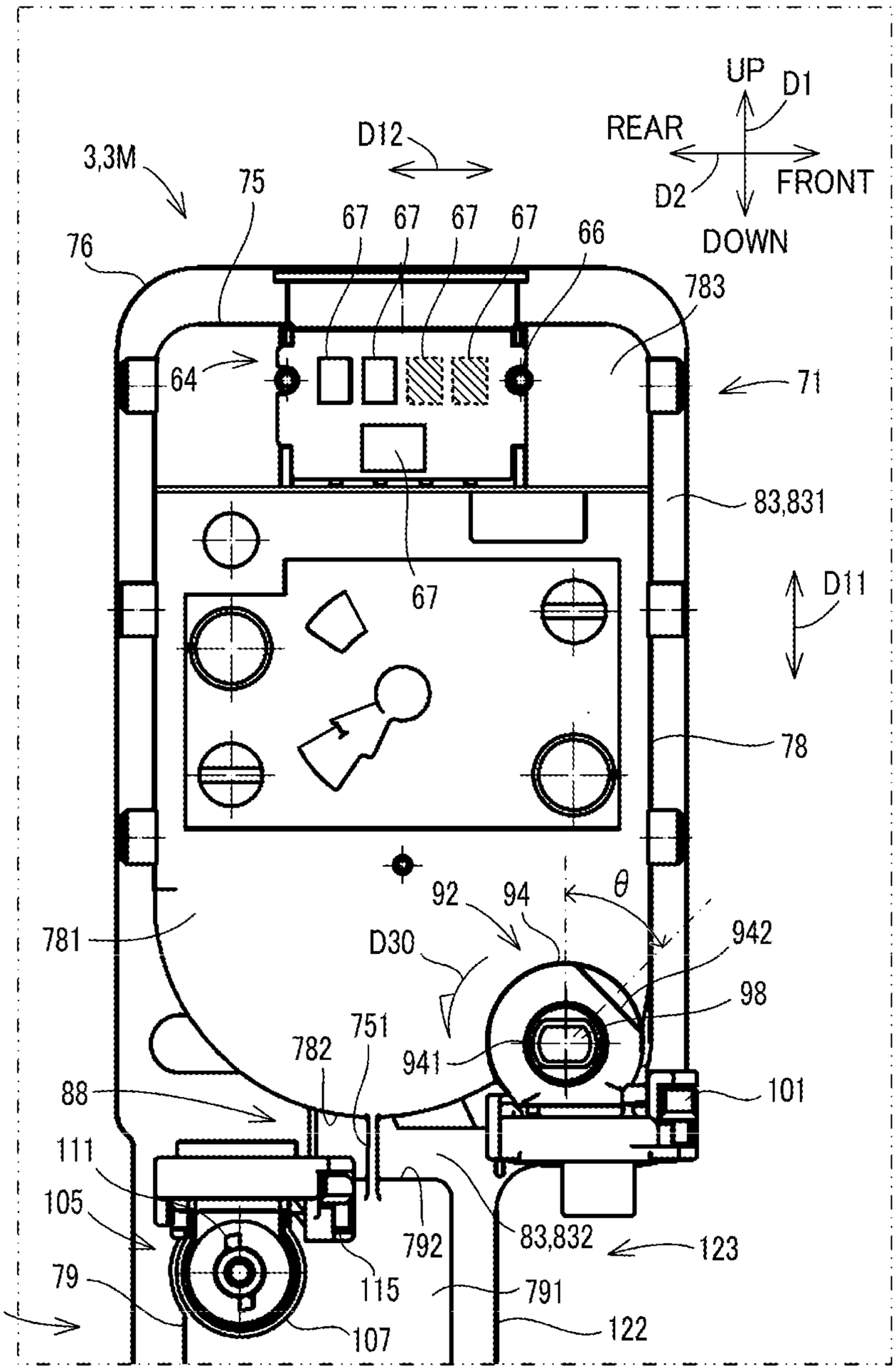
【FIG. 12】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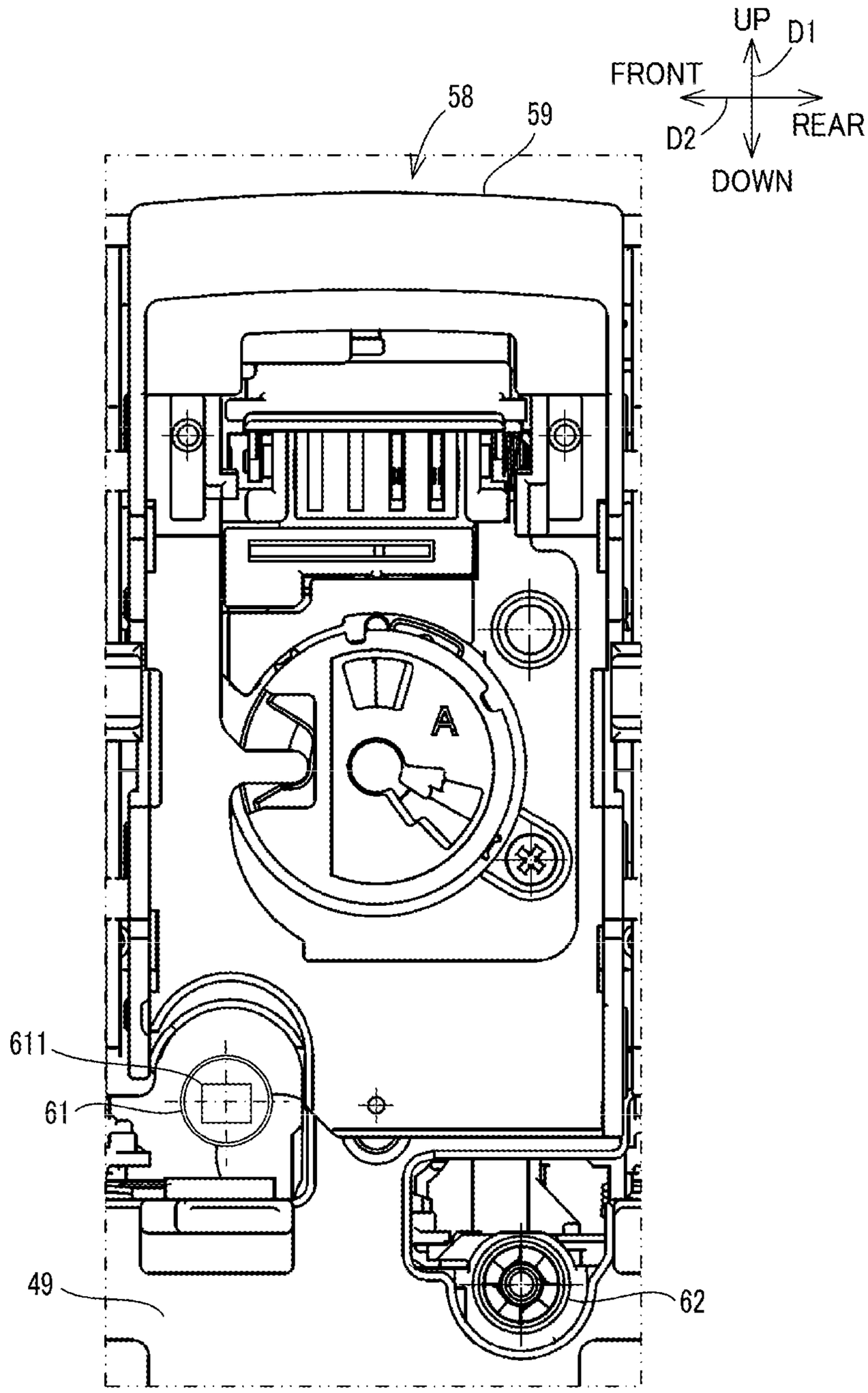
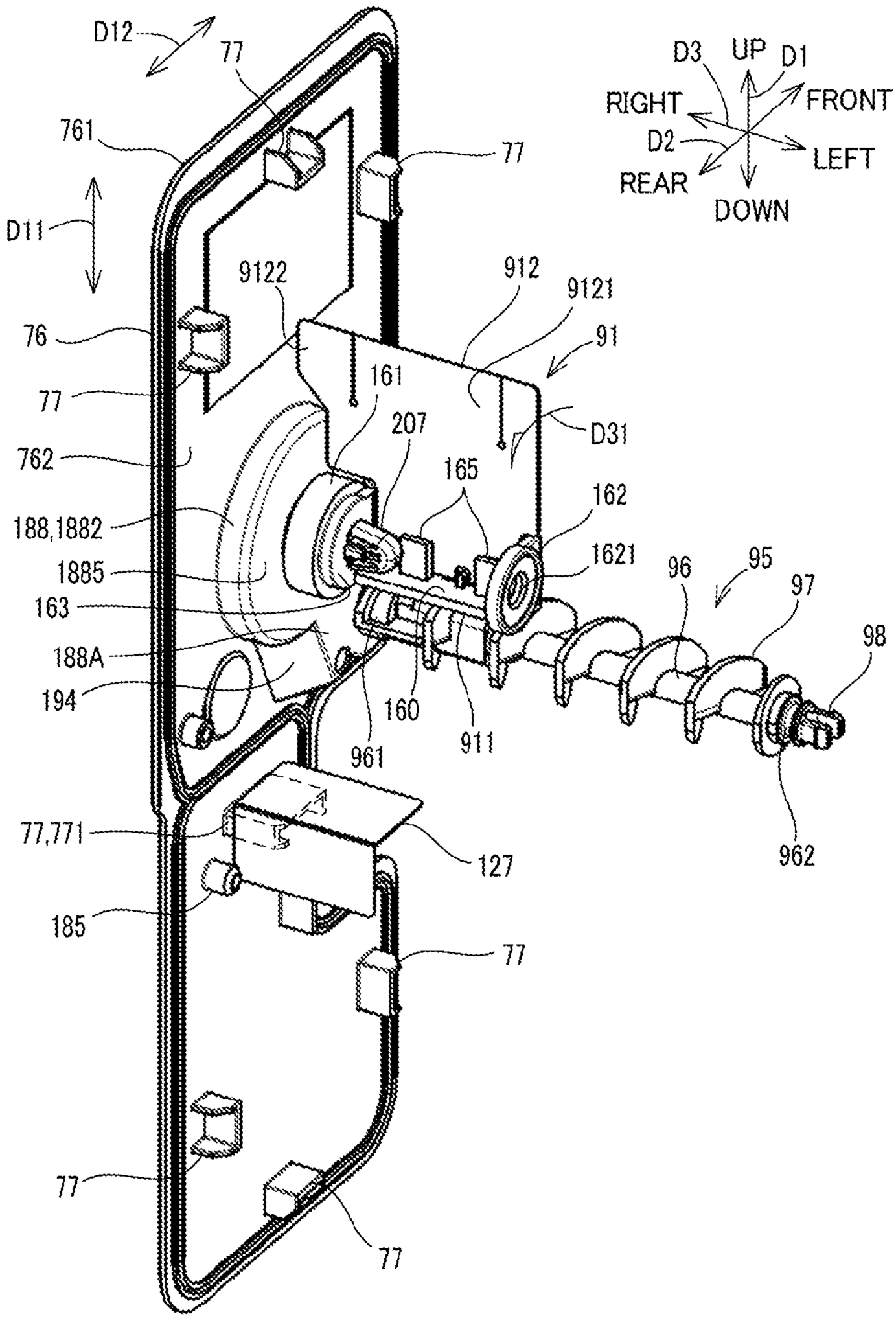
【FIG. 13】



【FIG. 14】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761
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91
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1621
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160
911
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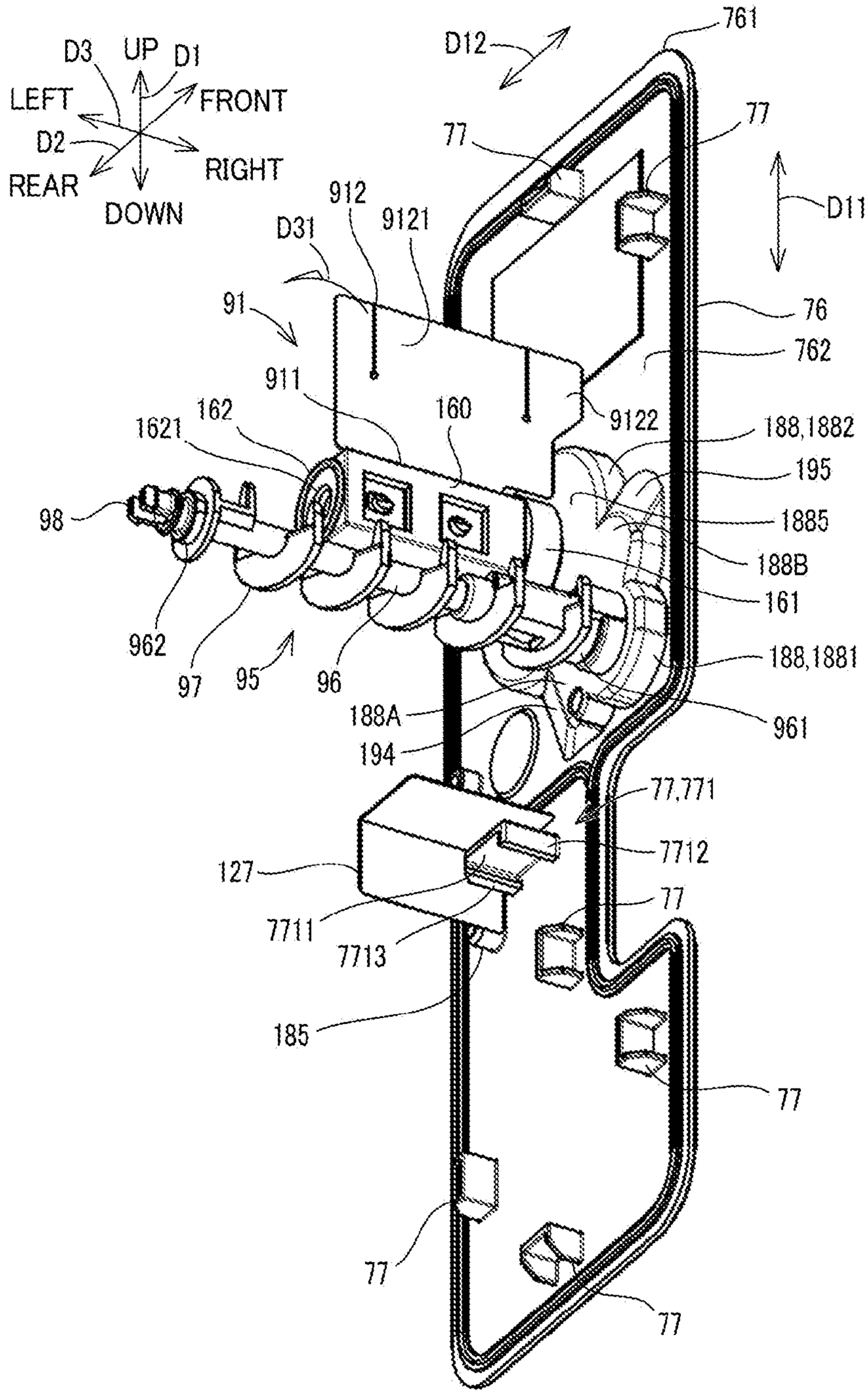
【FIG. 15】


D3
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160
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188,1882
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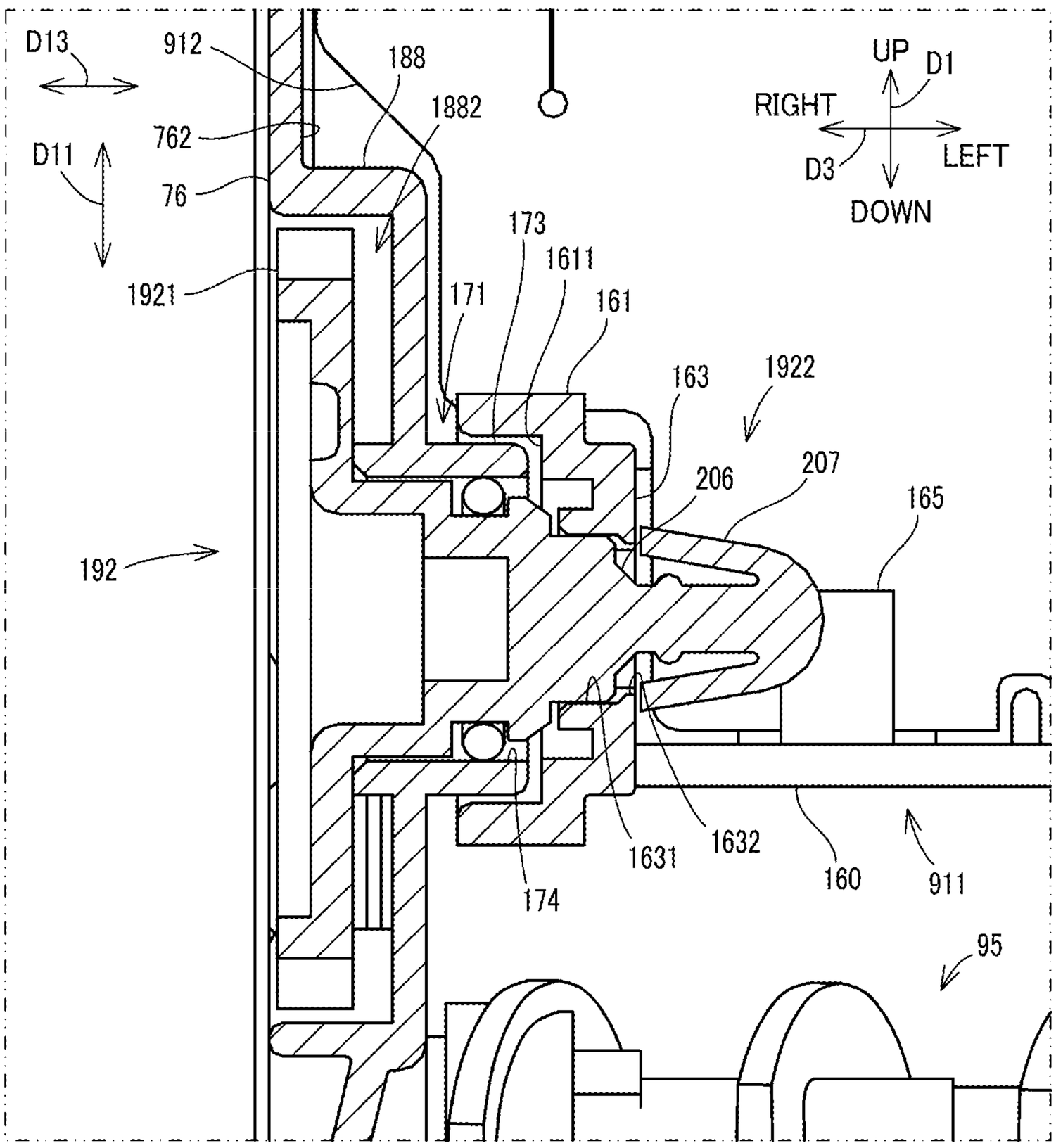
【FIG. 16】


D13
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D11
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161
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D3
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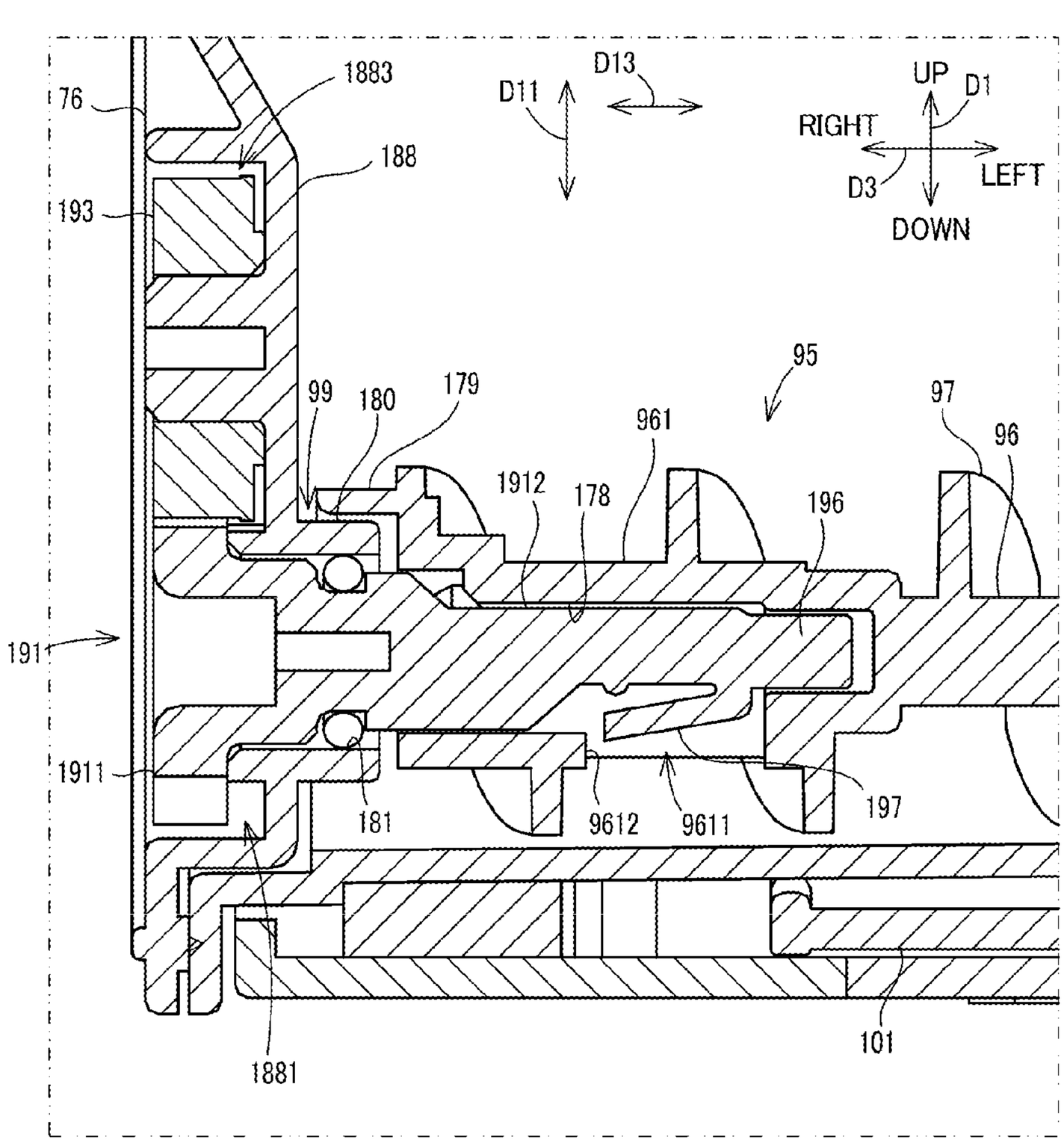
911
174
95

【FIG. 17】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1883
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193
D11
D13
UP
D1
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D3
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DOWN
95
99
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179
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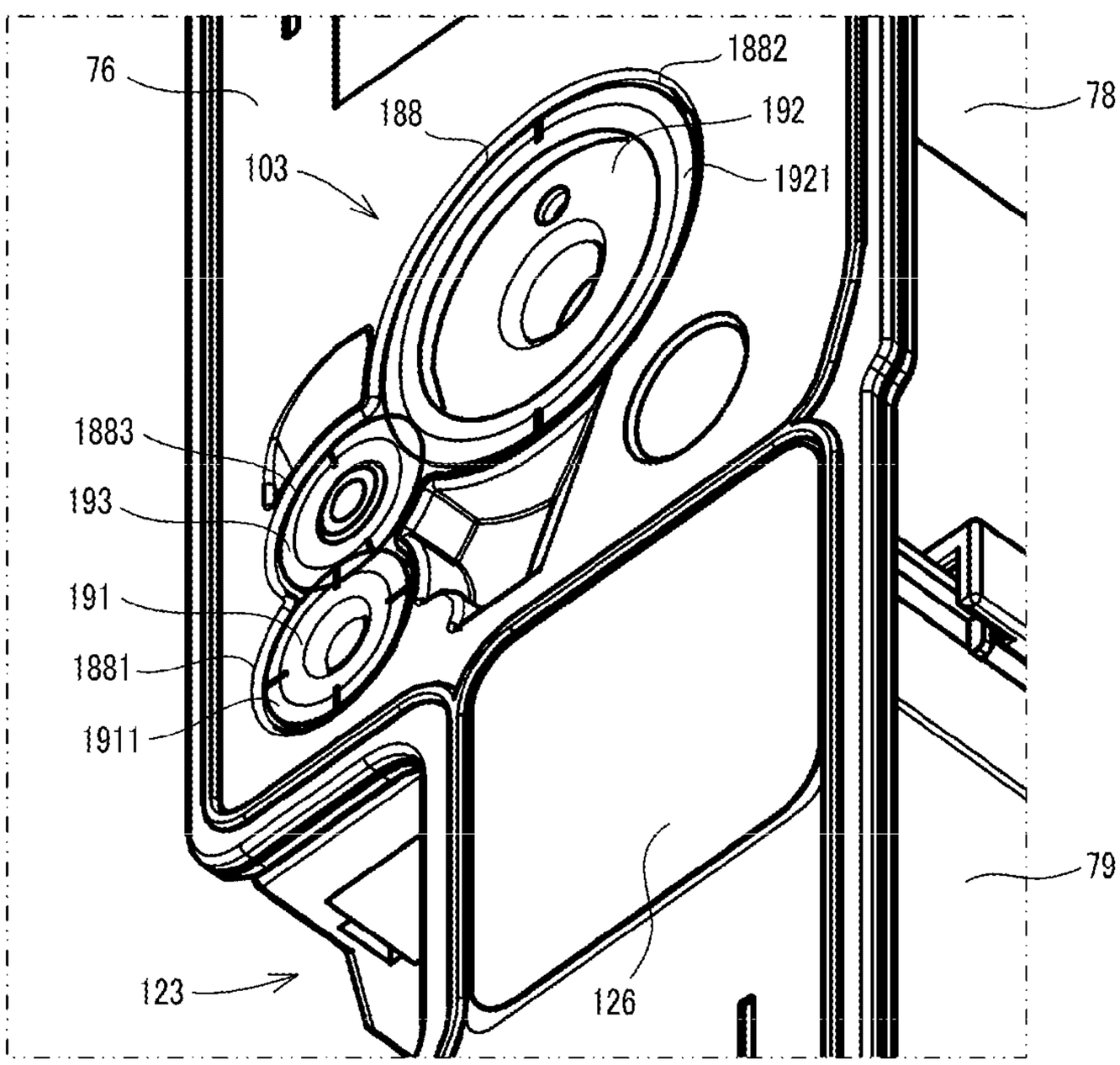
1911
181
9612
9611
197
101
1881

【FIG. 18】



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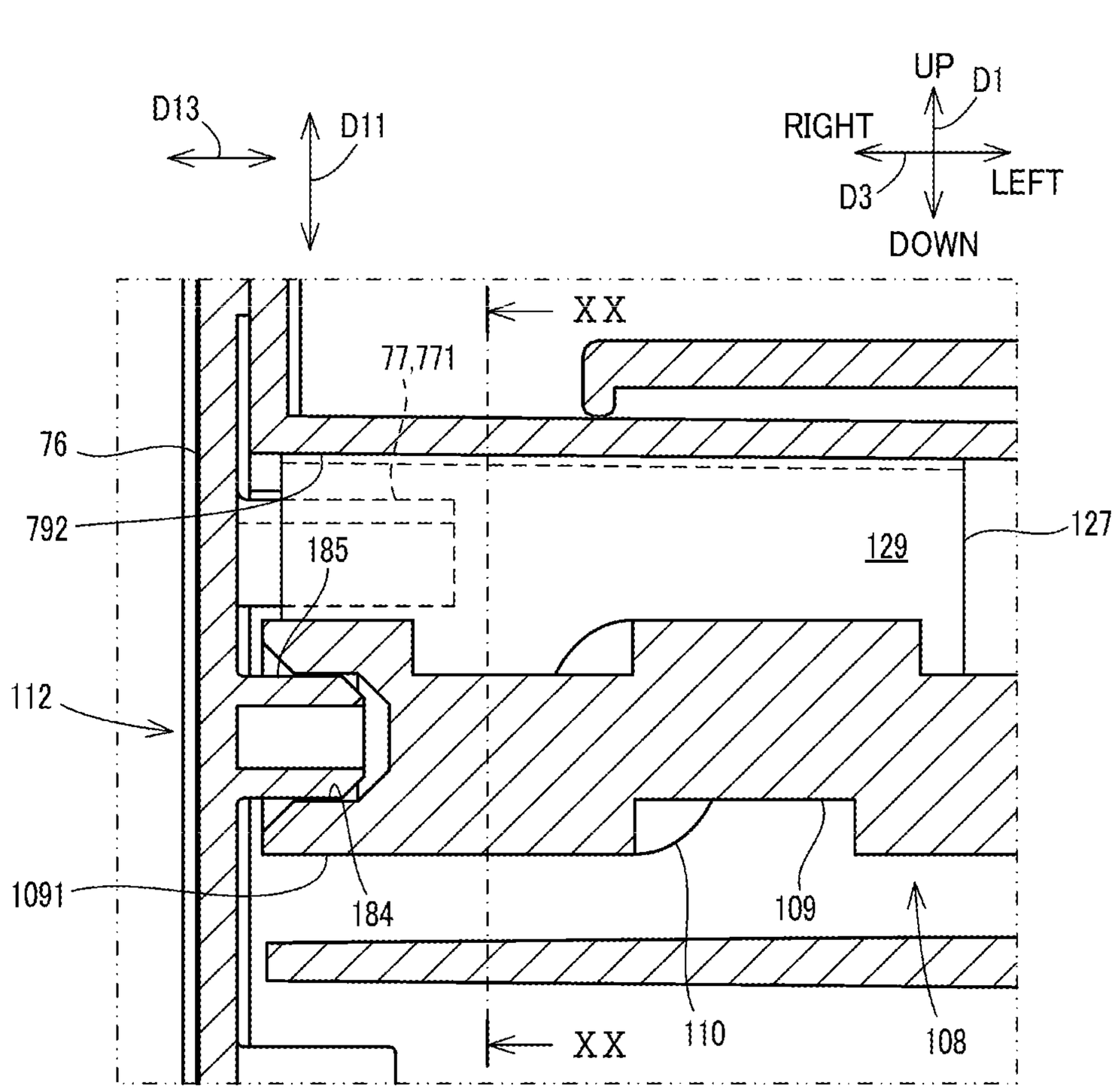
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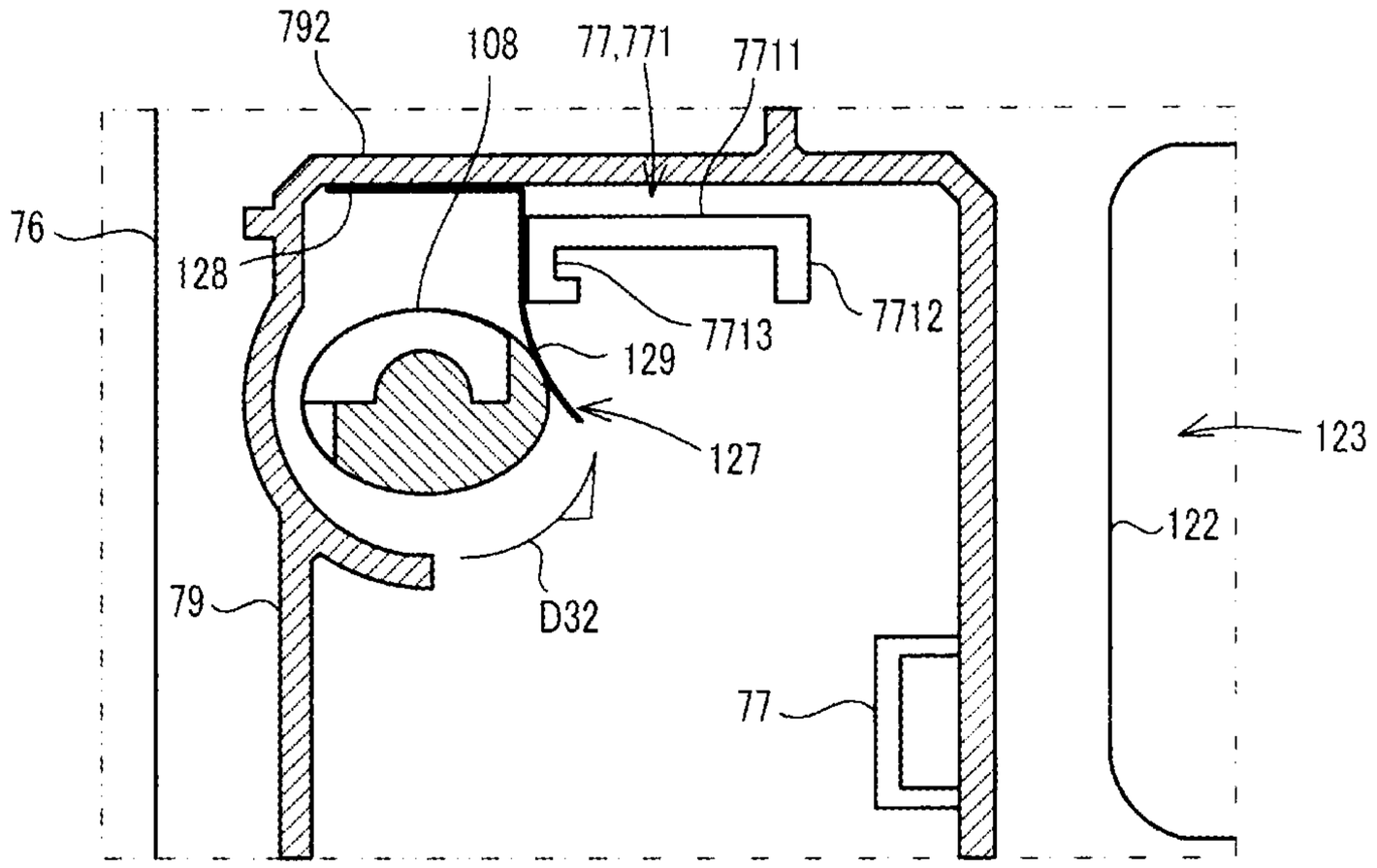
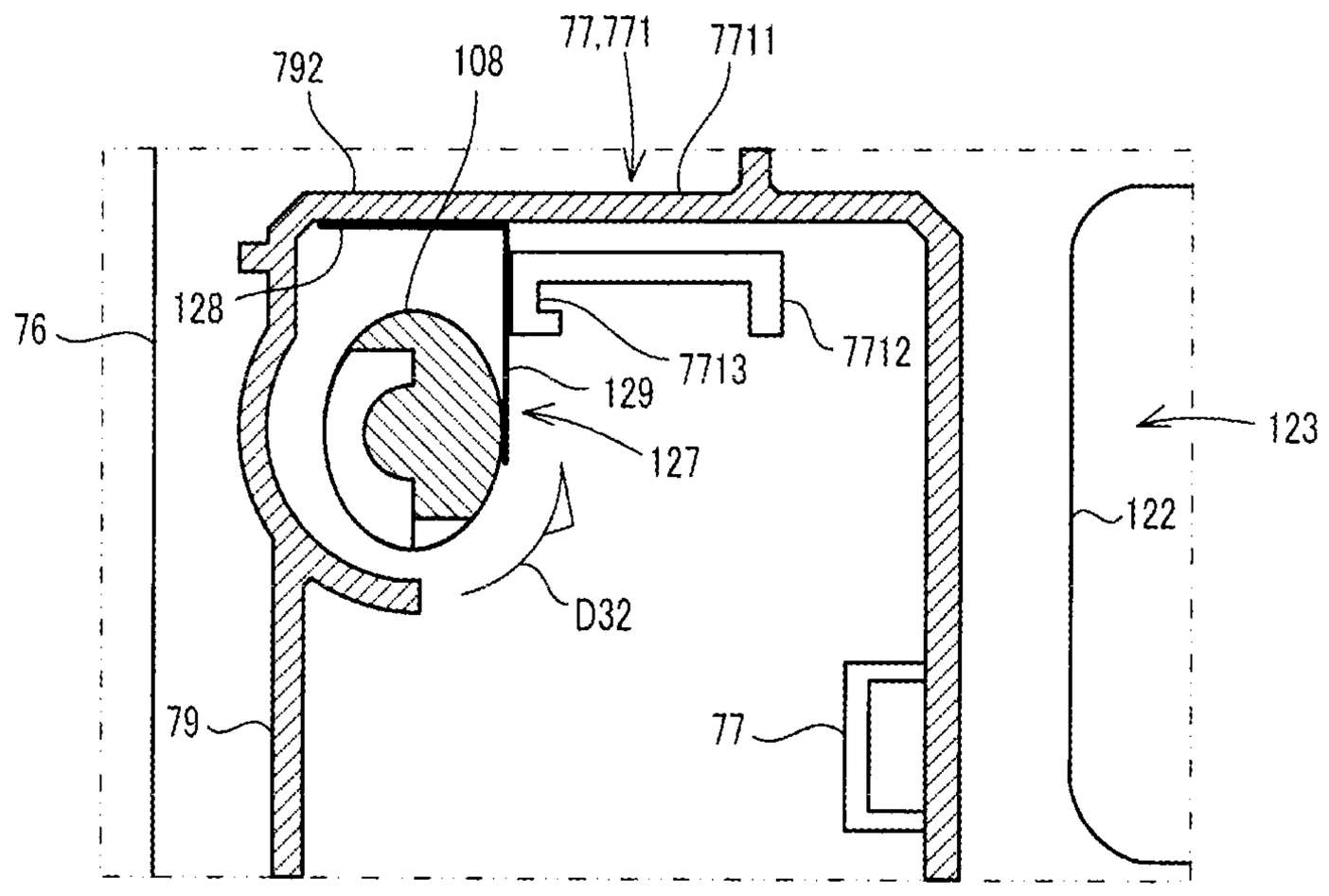
XX

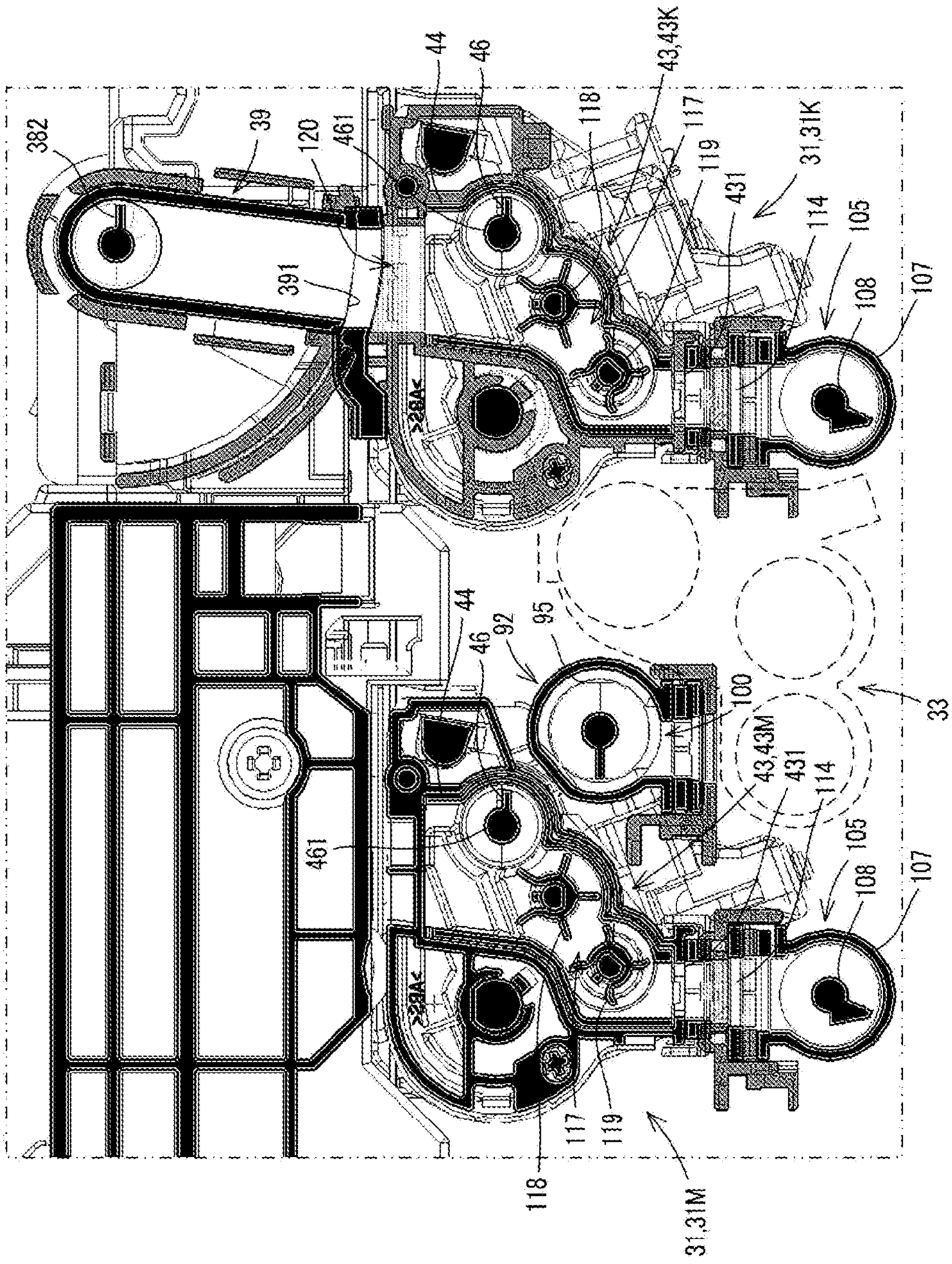
【FIG. 20A】



【FIG. 20B】



[FIG. 21]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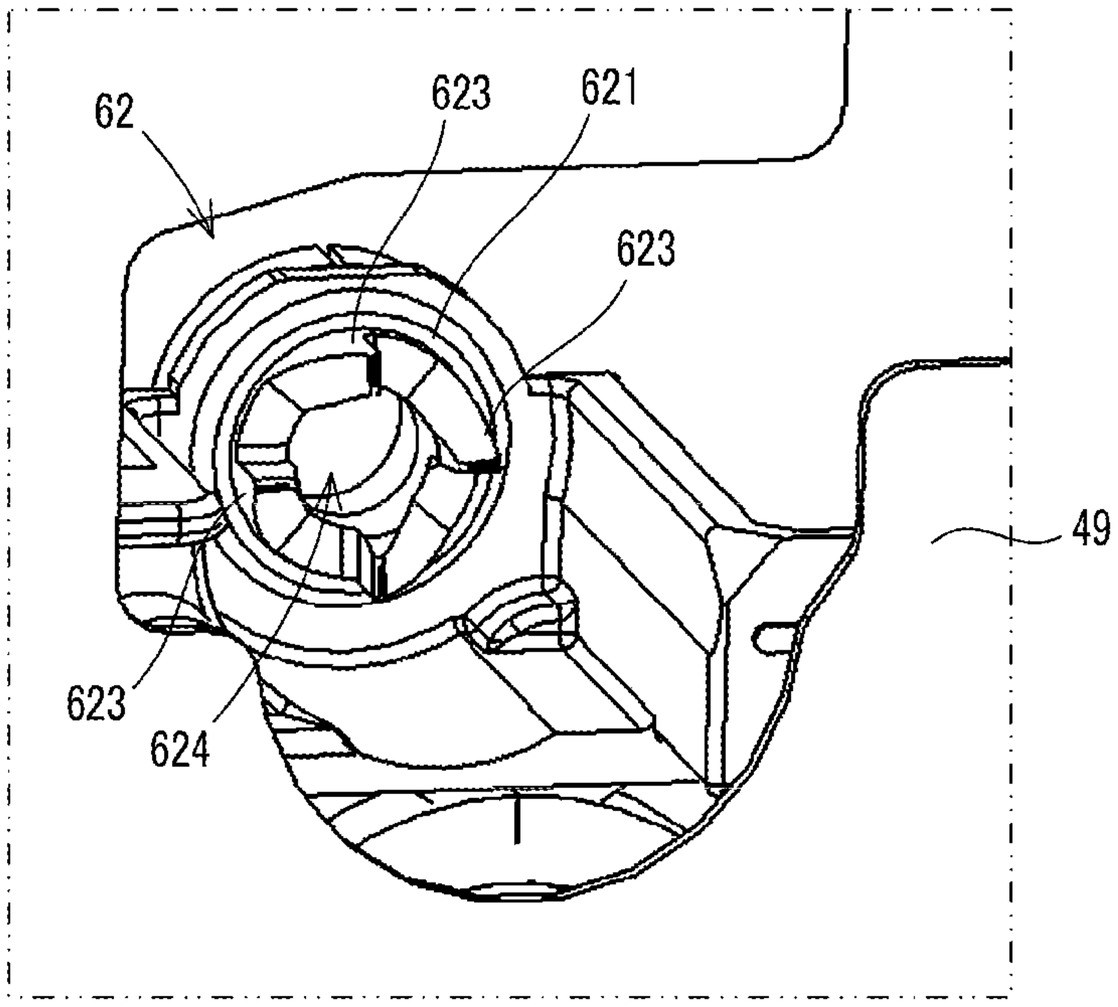
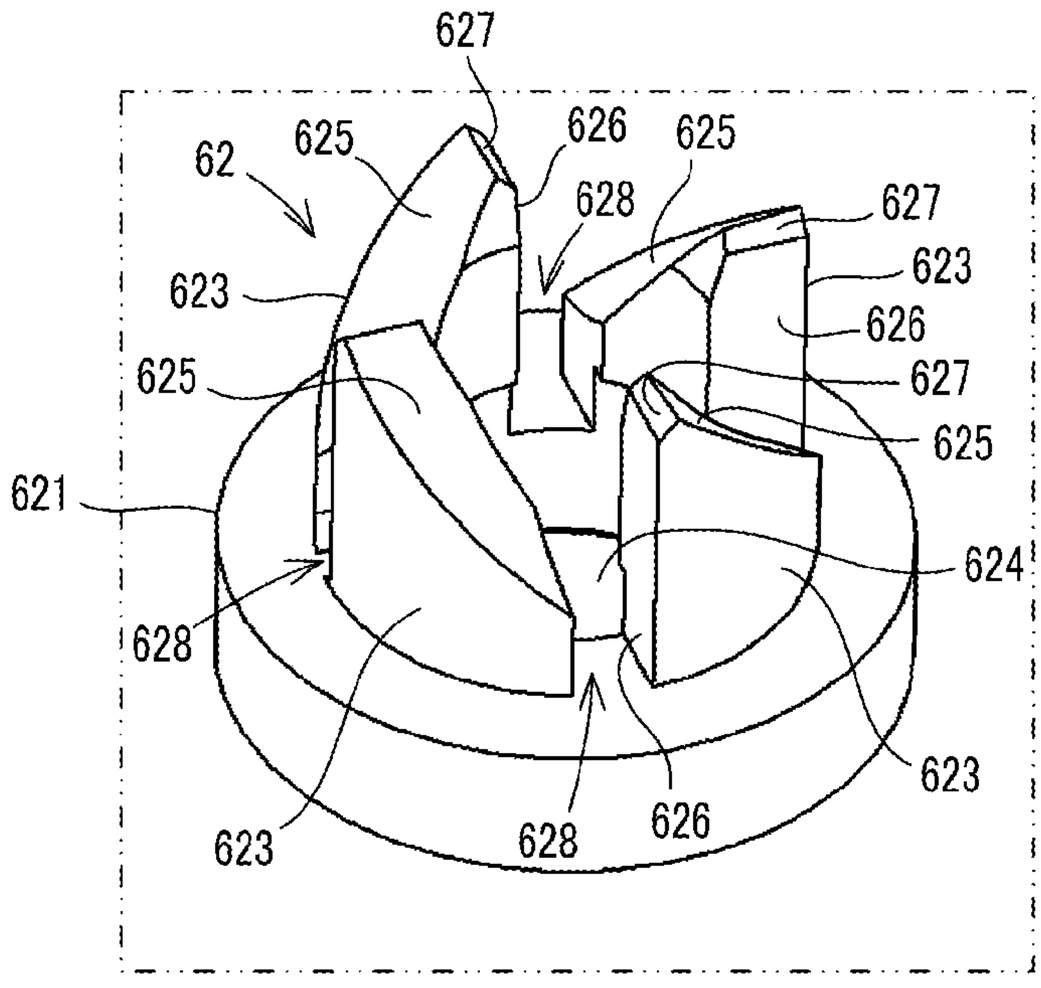
43,43M
31,31M

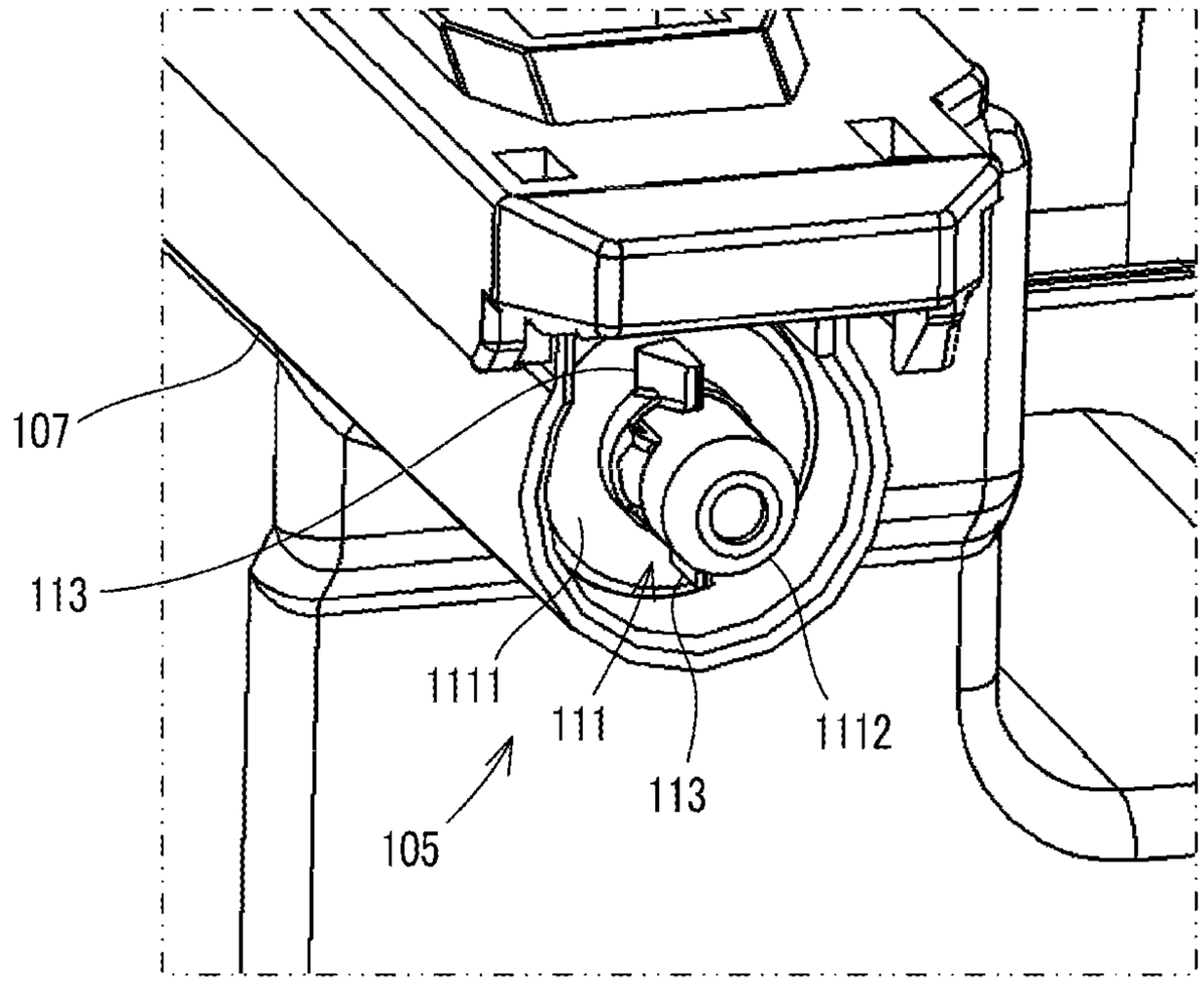
【FIG. 22A】



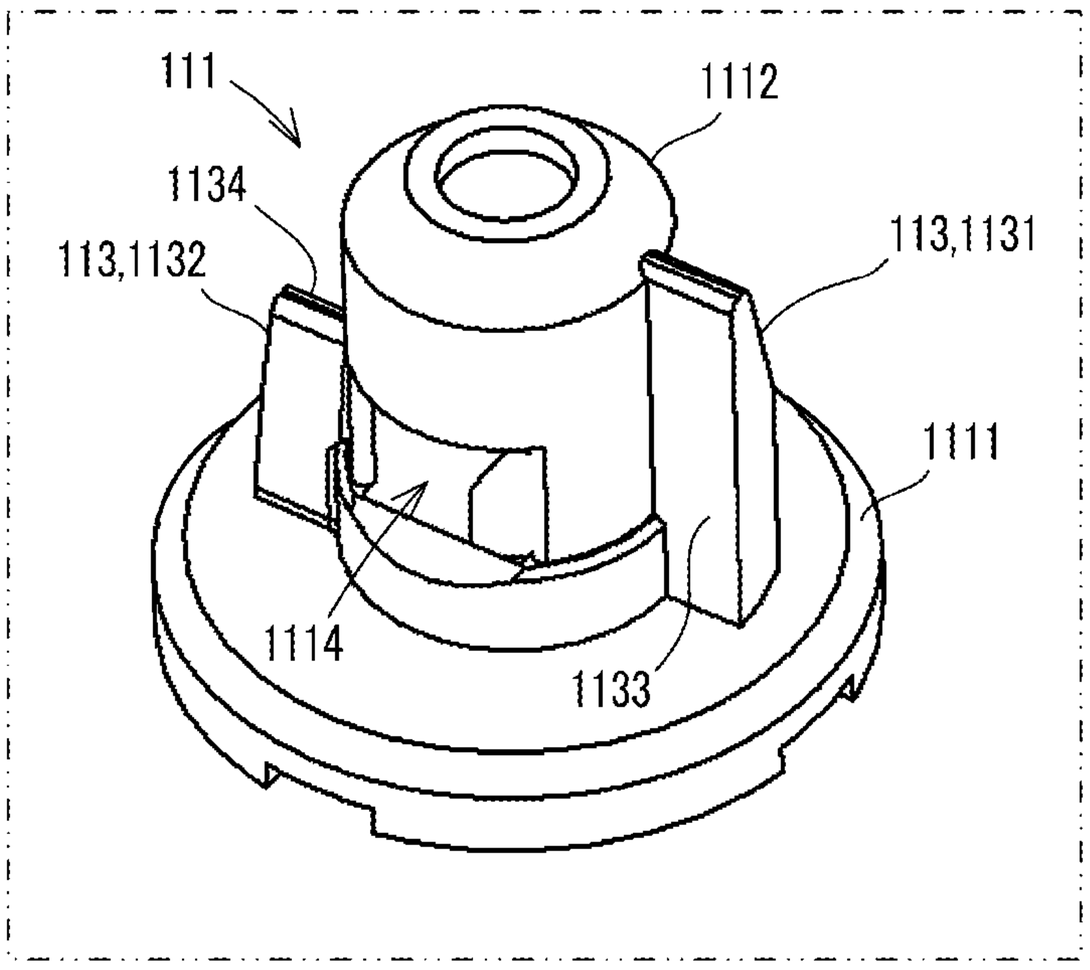
【FIG. 22B】



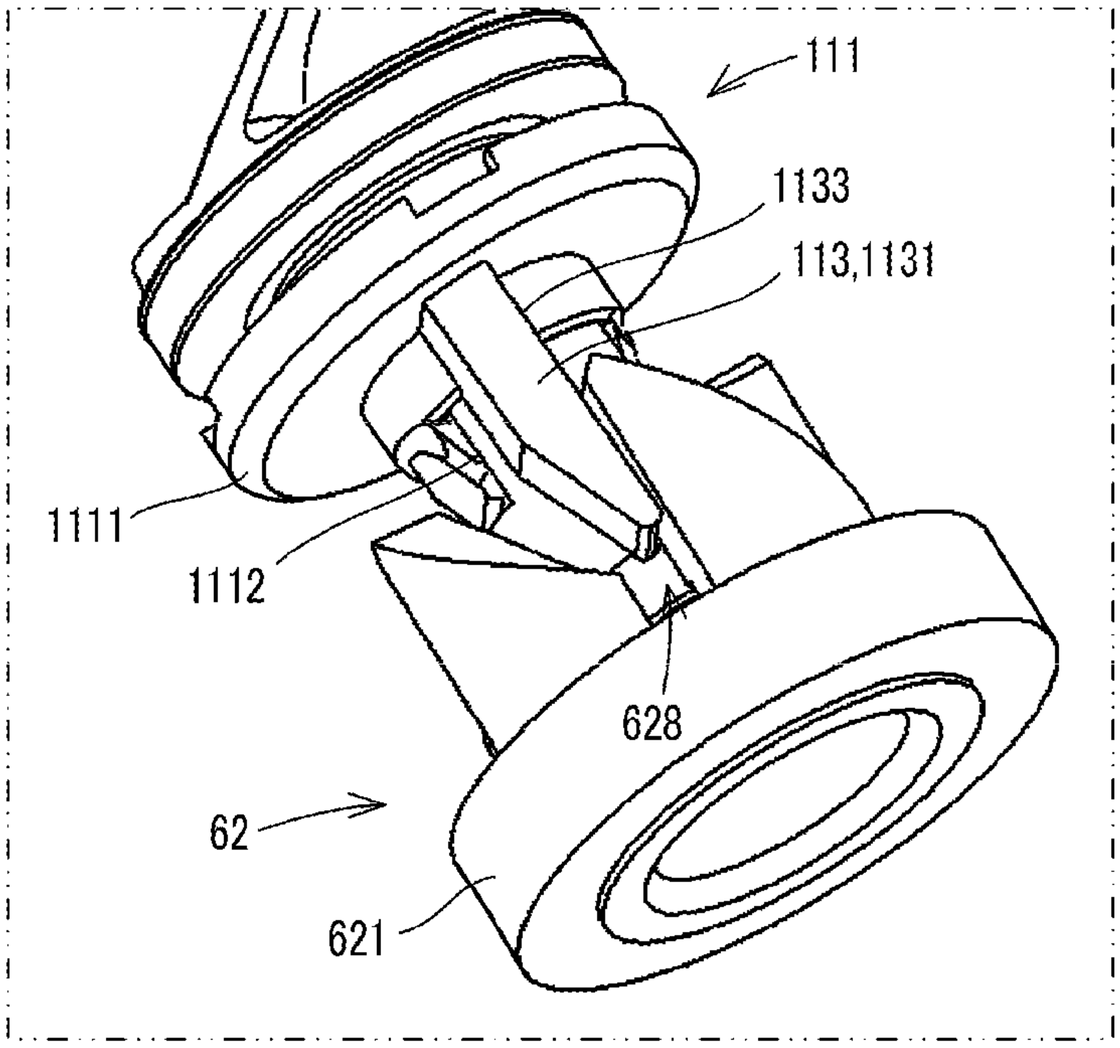
【FIG. 23A】



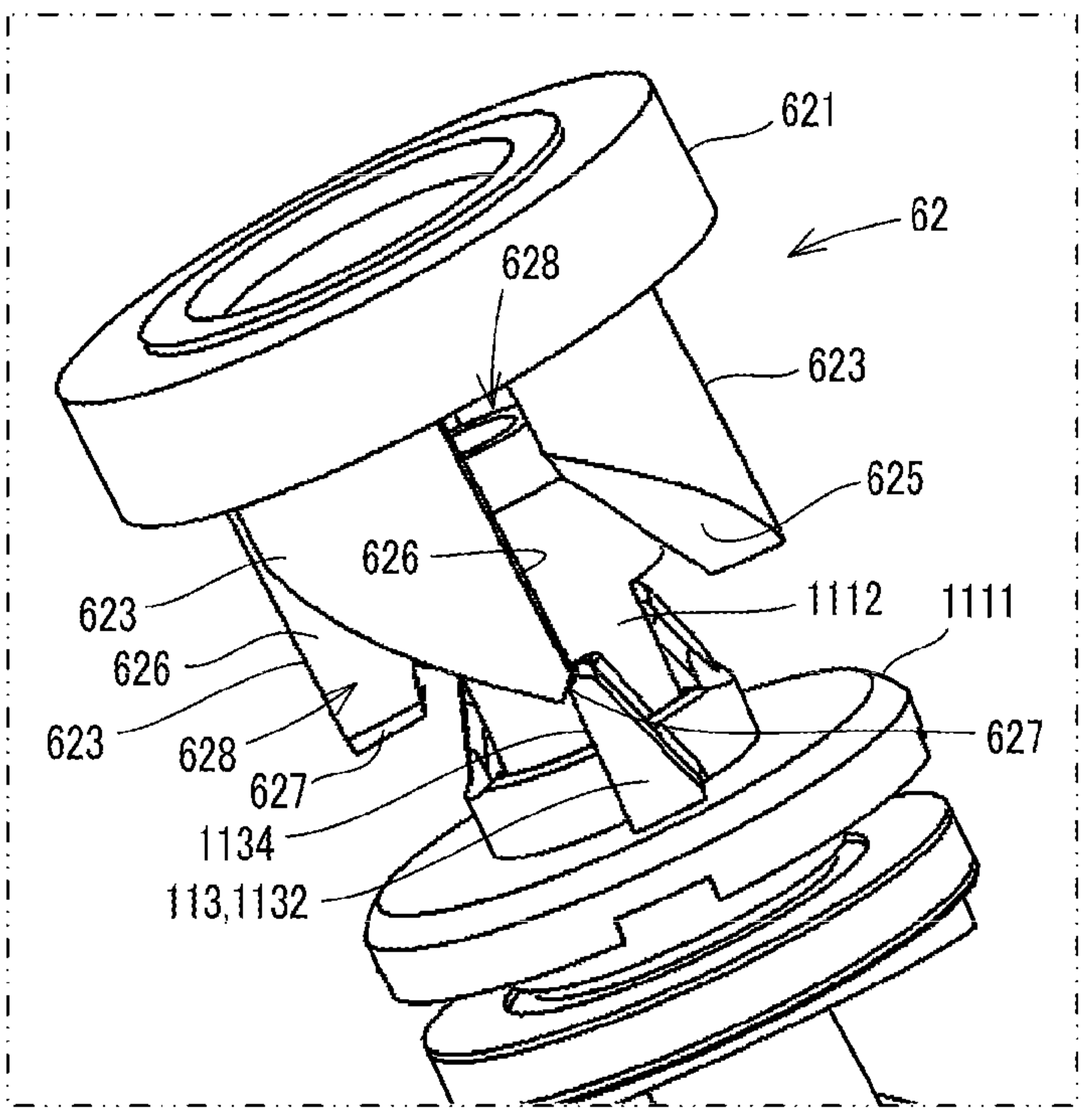
【FIG. 23B】



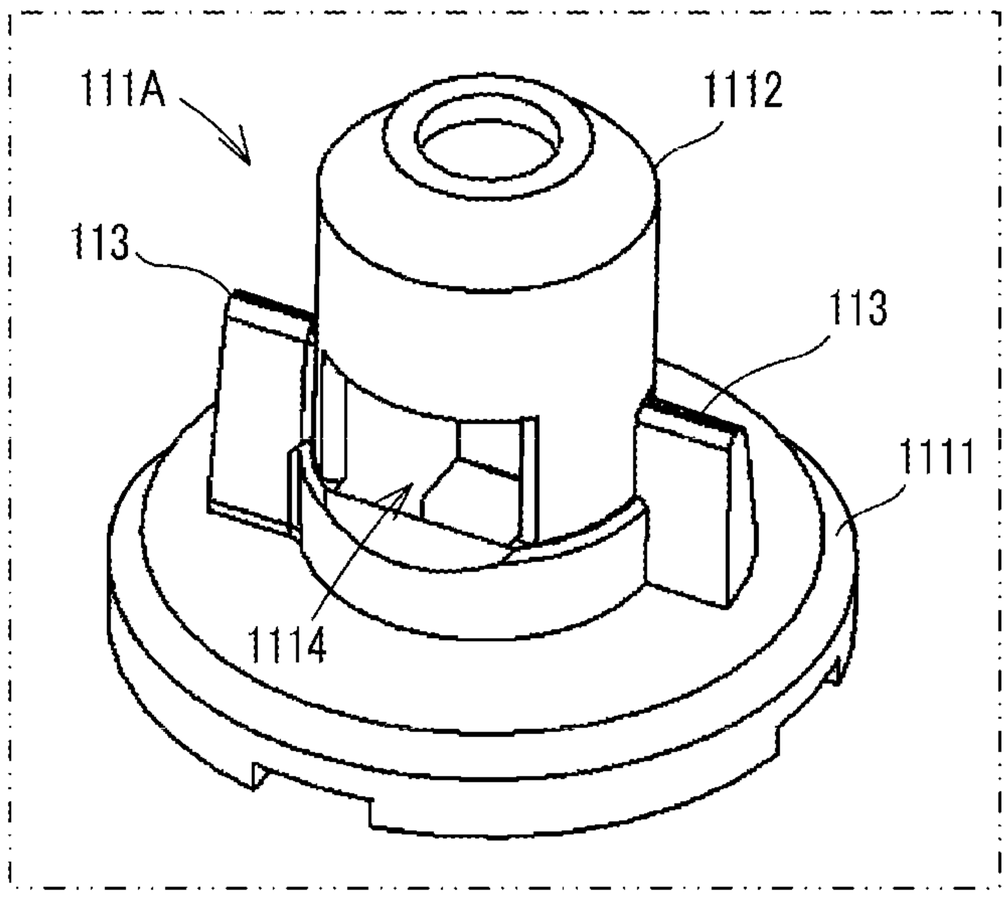
【FIG. 24A】



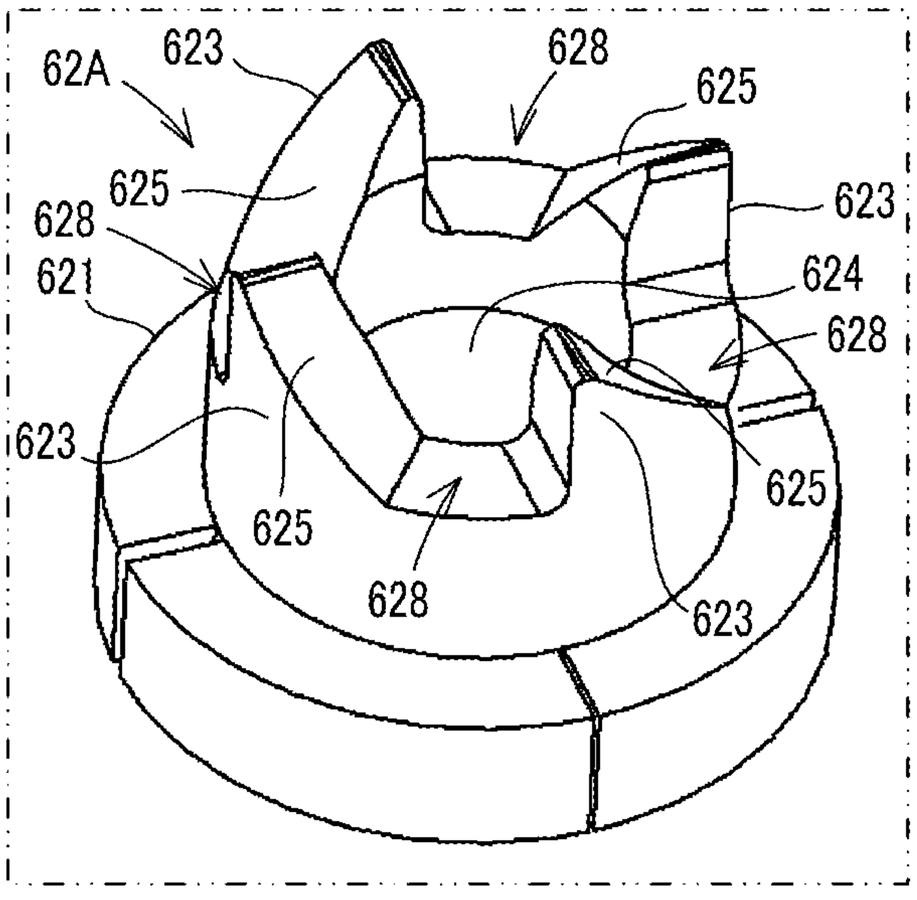
【FIG. 24B】



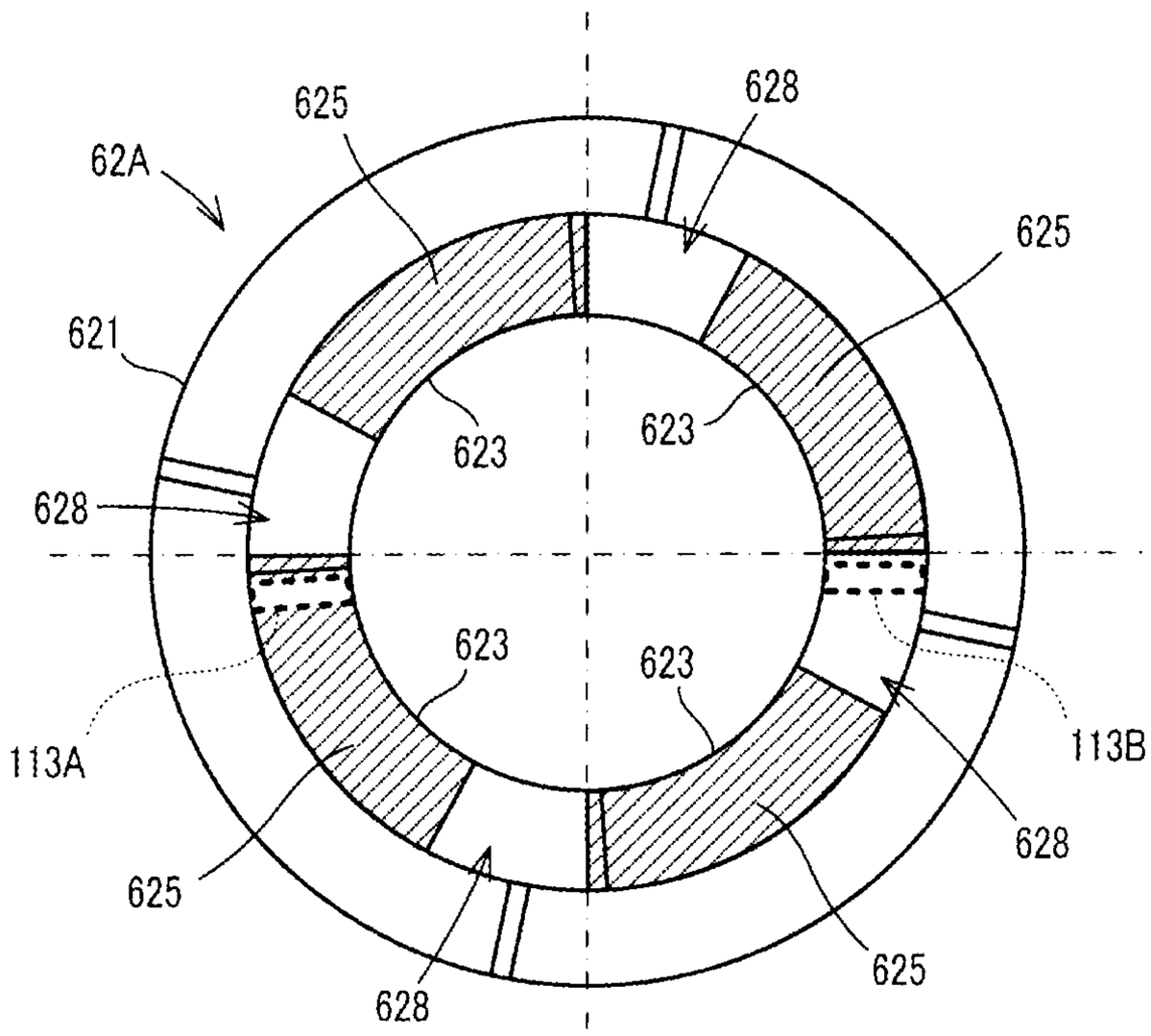
【FIG. 25A】



【FIG. 25B】



【FIG. 26】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625

TONER CONTAINER INCLUDING JOINT COUPLED WITH IMAGE FORMING APPARATUS

INCORPORATION BY REFERENCE

This application is based upon and claims the benefit of priority from the corresponding Japanese Patent Application No. 2016-114511 filed on Jun. 8, 2016, the entire contents of which are incorporated herein by reference.

BACKGROUND

The present disclosure relates to a toner container including a storage portion for storing toner, and relates to an image forming apparatus.

Conventionally, there is known an image forming apparatus that can form an image on a paper sheet by using developer that includes toner. In this type of image forming apparatus, a toner container for supplying toner to a developing device in the image forming apparatus is provided. The toner container is attached to an apparatus main body of the image forming apparatus in a detachable manner. When the toner in the toner container is consumed and the toner container becomes empty, the toner container is removed from the image forming apparatus to be replaced with a new toner container filled with unused toner.

In addition, the toner container is provided with a conveyance member for conveying unused toner stored in the toner container to a developing device included in the image forming apparatus, or a conveyance member for conveying used toner collected from the image forming apparatus to an inside of the toner container. As the conveyance member, there is known a spiral member that has a spiral blade and conveys toner in one direction by being rotated while the blade is in contact with the toner.

SUMMARY

A toner container according to an aspect of the present disclosure is attachable to an attachment portion included in an image forming apparatus and is inserted into the attachment portion along a vertical direction vertical to the attachment portion. The toner container includes a container main body, a first conveyance member, a first bearing hole, and a first input joint. The container main body is configured to store toner in an inside thereof and elongated in an up-down direction while the toner container is in an attachment attitude of being attached to the attachment portion. The first conveyance member is rotatably provided in the container main body in such a way as to extend in the vertical direction vertical to the attachment portion and perpendicular to a longitudinal direction of the container main body, and configured to convey the toner in the container main body. The first bearing hole is provided in the container main body and rotatably supports a rotation shaft of the first conveyance member in a state where the rotation shaft of the first conveyance member passes through the first bearing hole and extends out of a facing surface that faces the attachment portion while the toner container is in the attachment attitude. The first input joint is provided on an end portion of a rotation shaft of the first conveyance member in the attachment portion side, and configured to, upon being coupled with a first drive coupling portion of the attachment portion, receive, from the first drive coupling portion, a driving force that causes the first conveyance member to rotate. The first drive coupling portion includes a base portion and a plurality of engaging pieces. The base portion has a shaft hole. The engaging pieces project from the base portion toward the facing surface of the container main body and are disposed around the shaft hole. The first input joint includes a projection shaft and a plurality of projection pieces. The projection shaft is configured to be inserted through the shaft hole. The plurality of projection pieces are disposed around the projection shaft and configured to be respectively coupled with the plurality of engaging pieces while the toner container is in the attachment attitude. Among the plurality of projection pieces, at least one first piece is longer than the other second piece(s) in a projection direction of the projection shaft.

An image forming apparatus according to another aspect of the present disclosure includes an apparatus main body and a toner container. The apparatus main body includes an attachment portion. The toner container is attachable to the attachment portion and inserted into the attachment portion along a vertical direction vertical to the attachment portion. The toner container includes a container main body, a first conveyance member, a bearing hole, and a first input joint. The container main body is configured to store toner in an inside thereof and elongated in an up-down direction while the toner container is in an attachment attitude of being attached to the attachment portion. The first conveyance member is rotatably provided in the container main body in such a way as to extend in the vertical direction vertical to the attachment portion and perpendicular to a longitudinal direction of the container main body, and configured to convey the toner stored in the container main body. The bearing hole is provided in the container main body and rotatably supports a rotation shaft of the first conveyance member in a state where the rotation shaft of the first conveyance member passes through the bearing hole and extends out of a facing surface that faces the attachment portion while the toner container is in the attachment attitude. The first input joint is provided on an end portion of a rotation shaft of the first conveyance member in the attachment portion side, and configured to receive a driving force that causes the first conveyance member to rotate. The attachment portion includes a first drive coupling portion configured to be coupled with the first input joint and input the driving force to the first input joint while the toner container is in the attachment attitude. The first drive coupling portion includes a base portion and a plurality of engaging pieces. The base portion has a shaft hole. The engaging pieces project from the base portion toward the facing surface of the container main body and are disposed around the shaft hole. The first input joint includes a projection shaft and a plurality of projection pieces. The projection shaft is configured to be inserted through the shaft hole. The plurality of projection pieces are disposed around the projection shaft and configured to be respectively coupled with the plurality of engaging pieces while the toner container is in the attachment attitude. Among the plurality of projection pieces, at least one first piece is longer than the other second piece(s) in a projection direction of the projection shaft.

This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description with reference where appropriate to the accompanying drawings. This Summary is not intended to identify key features or essential features of the claimed subject matter, nor is it intended to be used to limit the scope of the claimed subject matter. Further-

more, the claimed subject matter is not limited to implementations that solve any or all disadvantages noted in any part of this disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view showing a configuration of an image forming apparatus according to an embodiment of the present disclosure.

FIG. **2** is a cross section showing a configuration of the image forming apparatus.

FIG. **3** is a cross section schematically showing an internal structure of an image forming unit included in the image forming apparatus.

FIG. **4** is a diagram showing attachment portions to which toner containers are attached.

FIG. **5** is a perspective view showing configurations of toner containers for magenta and black.

FIG. **6** is a perspective view showing internal structures of the toner containers for magenta and black.

FIG. **7** is a perspective view showing a configuration of a rear side of the toner container for magenta.

FIG. **8** is a perspective view showing a configuration of the rear side of the toner container for magenta.

FIG. **9** is a diagram showing a configuration of a front side of the toner container for magenta.

FIG. **10** is a cross section taken along a X-X line of FIG. **9**.

FIG. **11** is a cross section taken along an XI-XI line of FIG. **9**.

FIG. **12** is a partial enlarged diagram showing a configuration of the rear side of the toner container for magenta.

FIG. **13** is a partial enlarged diagram showing a configuration of an attachment portion to which the toner container for magenta is attached.

FIG. **14** is a perspective view showing a configuration of a lid member and inner members of the toner container for magenta.

FIG. **15** is a perspective view showing a configuration of the lid member and inner members of the toner container for magenta.

FIG. **16** is a diagram showing a configuration of a bearing portion of a stirring member, and is an enlarged view of a main part X**1** shown in FIG. **11**.

FIG. **17** is a diagram showing a configuration of a bearing portion of a spiral member of a first conveyance portion, and is an enlarged view of a main part X**2** shown in FIG. **10**.

FIG. **18** is an enlarged view of a gear transmission mechanism.

FIG. **19** is a diagram showing a configuration of a bearing portion of a spiral member of a second conveyance portion, and is an enlarged view of a main part X**3** shown in FIG. **11**.

FIG. **20**A is a cross section taken along an XX-XX line of FIG. **19**, and is a schematic diagram for explaining movements of the spiral member and a film member of the second conveyance portion.

FIG. **20**B is a cross section taken along the XX-XX line of FIG. **19**, and is a schematic diagram for explaining movements of the spiral member and the film member of the second conveyance portion.

FIG. **21** is a cross section showing a structure of a right-end portion of the image forming apparatus.

FIG. **22**A is an enlarged view showing a configuration of a peripheral of a second output joint in the attachment portion **58**.

FIG. **22**B is a perspective view showing a configuration of the second output joint.

FIG. **23**A is an enlarged view showing a configuration of a second input portion **111** in a second conveyance portion **105**.

FIG. **23**B is a perspective view showing a configuration of the second input portion **111**.

FIG. **24**A is a diagram showing a state where the second output joint is coupled with the second conveyance portion **105** in an inclined state.

FIG. **24**B is a diagram showing a state where the second output joint is coupled with the second conveyance portion **105** in an inclined state.

FIG. **25**A is a perspective view showing a configuration of a conventional second input portion.

FIG. **25**B is a perspective view showing a configuration of a conventional second output joint.

FIG. **26** is a diagram showing a state where the conventional second input portion is coupled with the conventional second output joint.

DETAILED DESCRIPTION

The following describes an embodiment of the present disclosure with reference to the drawings. It should be noted that the following embodiment is an example of a specific embodiment of the present disclosure and should not limit the technical scope of the present disclosure. It is noted that, for the sake of explanation, a vertical direction in an installed state of an image forming apparatus **10** where the image forming apparatus **10** is usable (the state shown in FIG. **1**) is defined as an up-down direction D**1**. In addition, a front-rear direction D**2** is defined on a supposition that a side to/from which a sheet feed cassette **22** shown in FIG. **1** is inserted and removed in the installed state is a front side. Furthermore, a left-right direction D**3** is defined based on the front side of the image forming apparatus **10** in the installed state.

The image forming apparatus **10** according to the present embodiment has at least a print function. The image forming apparatus **10** is, for example, a tandem-type color printer.

As shown in FIG. **1** and FIG. **2**, the image forming apparatus **10** includes a housing **11** (an example of the apparatus main body). The housing **11** has an approximately parallelepiped shape as a whole. Some of the components constituting the image forming apparatus **10** are stored in the housing **11**. It is noted that FIG. **1** shows a state where a cover covering the right side of the housing **11** has been removed.

As shown in FIG. **2**, the image forming apparatus **10** includes a plurality of image forming units **15** (**15**Y, **15**C, **15**M, and **15**K), an intermediate transfer unit **16**, a laser scanning device **17**, a primary transfer roller **18**, a secondary transfer roller **19**, a fixing device **20**, a sheet tray **21**, the sheet feed cassette **22**, a conveyance path **24**, and a control board **26** configured to control the portions of the image forming apparatus **10**. In addition, the image forming apparatus **10** includes toner containers **3** (see FIG. **1**) that have been attached to the inside of the housing **11** in a detachable manner. In the present embodiment, the image forming apparatus **10** includes four image forming units **15**.

FIG. **3** is a cross-sectional view of a central portion of an image forming unit **15**. The image forming unit **15** forms a toner image by the electrophotography. As shown in FIG. **3**, each of the image forming units **15** includes a drum unit **31**, a charging device **32**, and a developing device **33**.

As shown in FIG. **2**, the image forming units **15** are arranged in alignment along the front-rear direction D**2** in the housing **11**, and form a color image based on the

so-called tandem system. Specifically, the image forming unit **15**Y is configured to form a toner image of yellow. In addition, the image forming units **15**C, **15**M and **15**K are configured to form toner images of cyan, magenta and black, respectively. The image forming units **15**Y for yellow, **15**C for cyan, **15**M for magenta, and **15**K for black are arranged in alignment in the stated order from the downstream side in the running direction (the direction indicated by the arrow D**10**) of a transfer belt **35** of the intermediate transfer unit **16**.

The drum unit **31** includes a photoconductor drum **41**, a drum cleaning device **42** (an example of the drum cleaning portion), a discharge guide portion **43** (see FIG. **21**), and a housing **44** that supports these components. The housing **44** is elongated in the left-right direction D**3**. The photoconductor drum **41** has a cylindrical shape and carries a toner image developed by the developing device **33**. The photoconductor drum **41** is rotatably supported by the housing **44**.

In each of the image forming units **15**, the charging device **32** uniformly charges the photoconductor drum **41** to a certain potential. Subsequently, the laser scanning device **17** irradiates a laser beam on the surface of the photoconductor drum **41** based on the image data. In this processing, electrostatic latent images are formed on the surfaces of the photoconductor drums **41**, respectively. The electrostatic latent images are developed (visualized) as toner images by the developing devices **33**, respectively. The toner images of respective colors formed on the surfaces of the photoconductor drums **41** are transferred to the transfer belt **35** by the primary transfer roller **18** such that the toner images are overlaid with each other in sequence. Next, the color image on the transfer belt **35** is transferred by the secondary transfer roller **19** to a print sheet. The color image transferred to the print sheet is fixed to the print sheet by the fixing device **20**, and thereafter, the print sheet is discharged from a sheet discharge port **28** to the sheet tray **21**.

The drum cleaning device **42** is configured to remove toner that has remained on the photoconductor drum **41** after the transfer. The drum cleaning device **42** is disposed on the rear side of the photoconductor drum **41**. The drum cleaning device **42** is provided for each photoconductor drum **41**. The drum cleaning device **42** includes a cleaning blade **45** that is a cleaning member, and a spiral member **46**. The cleaning blade **45** and the spiral member **46** are elongated in the left-right direction D**3**. The cleaning blade **45** and the spiral member **46** are supported by the housing **44**. The cleaning blade **45** has approximately the same length as the photoconductor drum **41**. The tip of the cleaning blade **45** is disposed so as to be in contact with or close to the surface of the photoconductor drum **41**. The spiral member **46** is a toner conveyance member having a spiral blade around a shaft. The spiral member **46** is rotatably supported in the housing **44**.

The spiral member **46** is rotated when a rotational driving force is input to its shaft. While the photoconductor drum **41** is rotated, the cleaning blade **45** removes toner that has remained on the surface of the photoconductor drum **41** after the transfer by the primary transfer roller **18**. The removed toner is to be discarded later, and thus called waste toner in general. The waste toner is conveyed toward a certain direction by the rotating spiral member **46**. Specifically, the waste toner is conveyed toward one side (in the present embodiment, the right side) in the axial direction (longitudinal direction) of the photoconductor drum **41**.

As shown in FIG. **21**, the discharge guide portion **43** is disposed at the right end of the housing **44**. The waste toner is guided downward by the discharge guide portion **43**, passes through a discharge port **431** (see FIG. **21**) that is described below, and is discharged to a lower storage portion **72** of the toner container **3**. It is noted that the discharge guide portion **43** is described below.

As shown in FIG. **3**, the developing device **33** includes a housing **50**, a first stirring member **52**, a second stirring member **53**, and a developing roller **54**. Toner (developer) is stored in a bottom portion of the housing **50** and the toner is conveyed while being stirred by the first stirring member **52** and the second stirring member **53**. A supply port **56** is formed in a wall **51** of the housing **50** that is located above the first stirring member **52**. The supply port **56** is formed at the right end of the wall **51**. The toner discharged from the toner container **3** is supplied from the supply port **56** into the housing **50**. The developing roller **54** draws up the toner from the second stirring member **53** by the magnetic pole embedded therein, and carries the toner on its circumferential surface. The toner held on the developing roller **54** is caused to adhere to the electrostatic latent image on the photoconductor drum **41** by the potential difference applied to between the developing roller **54** and the photoconductor drum **41**.

As shown in FIG. **1**, a plurality of toner containers **3** (**3**Y, **3**C, **3**M and **3**K) are attached to the inside of the housing **11**. Specifically, the four toner containers **3** are respectively attached to attachment portions **58** (see FIG. **4**) provided in the inside of the housing **11**. In addition, in the present embodiment, a plurality of toner containers **3** are attached in a state of being aligned along the front-rear direction D**2**, and a toner container **3**K for black is disposed at the rear-most position.

Each of the toner containers **3** includes an upper storage portion **71** (an example of the first toner storage portion) and a lower storage portion **72** (an example of the second toner storage portion). The upper storage portion **71** includes, inside thereof, a storage space **85** (see FIG. **6**) for storing toner, and unused toner for supply is stored in the storage space **85**. The lower storage portion **72** includes, inside thereof, a storage space **86** (see FIG. **6**) for storing toner, and the waste toner discharged from the drum cleaning device **42** is stored in the storage space **86**. In the state where the toner containers **3** are respectively attached to the attachment portions **58**, the unused toner is supplied to the insides of the developing devices **33** from the upper storage portions **71** of the toner containers **3**. In addition, waste toner discharged from the drum cleaning devices **42** passes through the discharge guide portions **43** (see FIG. **21**), and is stored in the lower storage portions **72** of the toner containers **3**. As shown in FIG. **1**, in the present embodiment, the four toner containers **3** are located at the right side of the image forming units **15** inside a right-side cover (not shown) of the housing **11**. The toner containers **3** are arranged on the right side of the housing **11** in alignment along the front-rear direction D**2**. The toner containers **3** are described in detail below.

As shown in FIG. **2**, the intermediate transfer unit **16** is provided above the four image forming units **15**. More specifically, the intermediate transfer unit **16** is provided above the photoconductor drums **41**. The intermediate transfer unit **16** includes the transfer belt **35**, a driving roller **36**, a driven roller **37**, a belt cleaning device **38** (an example of the belt cleaning portion), and a relay guide portion **39** (see FIG. **21**). It is noted that the primary transfer roller **18** is supported by a frame (not shown) of the intermediate transfer unit **16**.

The transfer belt **5**, an annular belt member, is suspended between the driving roller **36** and the driven roller **37** so as to extend in the front-rear direction D**2**. A plurality of drum

units **31** are arranged in alignment in the front-rear direction D**2** along the transfer belt **35**. The transfer belt **35** holds, on its surface, toner images primarily transferred from the photoconductor drums **41**. When the transfer belt **35** is rotationally driven and moves in a direction indicated by the arrow D**10**, the toner images of respective colors carried by the photoconductor drums **41** are transferred to the transfer belt **35** such that the toner images are overlaid with each other in sequence.

The belt cleaning device **38** is disposed in the vicinity of the fixing device **20**. Specifically, the belt cleaning device **38** is provided above the transfer belt **35** in the rear side of the housing **11**. Below the belt cleaning device **38**, the image forming unit **15**K, which is an image forming unit **4** for black, is disposed. That is, the belt cleaning device **38** is located closest to the image forming unit **15**K for black among the plurality of image forming units **4**.

The belt cleaning device **38** is configured to remove the waste toner that has remained on the surface of the transfer belt **35**, and convey the removed waste toner toward the lower storage portion **72** of the toner container **3**K. The belt cleaning device **38** includes a cleaning roller **381** that is elongated in the left-right direction D**3**, a spiral member **382** as a conveyance member for conveying the waste toner, and a housing **383** for storing these components (see FIG. **2**). The cleaning roller **381** is configured to remove the waste toner from the surface of the transfer belt **35** by rotating while in contact with the surface of the transfer belt **35**. The used toner thus removed (hereinafter referred to as "waste toner") is conveyed in a certain direction by the spiral member **382** as it rotates. Specifically, the waste toner is conveyed toward one side in the width direction (a direction that matches the left-right direction D**3**) of the transfer belt **35** (in the present embodiment, conveyed toward the right side).

As shown in FIG. **21**, the relay guide portion **39** is provided at the right end of the housing **383**. The waste toner is guided downward by the relay guide portion **39**, passes through a discharge guide portion **43**K of a drum unit **31**K disposed at the rear-most position, and is conveyed to the lower storage portion **72** of the toner container **3**K. It is noted that the relay guide portion **39** is described below.

FIG. **21** is a partial enlarged diagram showing a cross-sectional structure of a right-end portion of the drum units **31** of the image forming units **15**. FIG. **21** shows cross-sectional structures of the drum unit **31**M for magenta and the drum unit **31**K for black. For the sake of explanation, in FIG. **21**, a developing device **33** corresponding to the drum unit **31**K is represented by a dotted line. As shown in FIG. **21**, a discharge guide portion **43**M is provided at the right end of the housing **44** of the drum unit **31**M. That is, the discharge guide portion **43**M is provided in the drum unit **31**M. It is noted that a discharge guide portion **43** having the same structure as the discharge guide portion **43**M is provided in each of the drum units **31** for yellow and cyan.

The discharge guide portion **43**M guides the waste toner that has been removed by the drum cleaning device **42** in the drum unit **31**M and conveyed to the right end of the housing **44**, to an inlet **114** of the lower storage portion **72** of the toner container **3**M. An inner space of the discharge guide portion **43**M is a passage **117** in which the waste toner passes. The discharge guide portion **43**M extends diagonally downward from above, and the discharge port **431** connected to the inlet **114** is formed at a lower end of the discharge guide portion **43**M.

In the passage **117**, a right end portion **461** of the spiral member **46** is disposed. The end portion **461** is rotatably supported by the discharge guide portion **43**M. When a rotational driving force is transmitted to the end portion **461**, the spiral member **46** rotates, and the waste toner is conveyed to the passage **117** of the discharge guide portion **43**M.

In the passage **117**, two paddle portions **118** and **119** are provided in a region from the end portion **461** to the discharge port **431**. The rotation shaft of each of the paddle portions **118** and **119** is rotatably supported by the discharge guide portion **43**M. The rotational driving force of the spiral member **46** is transmitted to the paddle portions **118** and **119** via a gear transmission mechanism (not shown). When the spiral member **46** is rotated, its rotational driving force is transmitted to the paddle portions **118** and **119** via the gear transmission mechanism, and the paddle portions **118** and **119** are rotated. When the paddle portions **118** and **119** rotate, the waste toner that has been conveyed to the passage **117** is conveyed in the passage **117** to the discharge port **431** by the paddle portions **118** and **119**, is further passed through the inlet **114** and a first conveyance guide portion **94** (an example of the first guide portion) of the toner container **3**M, and guided into the lower storage portion **72** of the toner container **3**M.

As shown in FIG. **21**, a discharge guide portion **43**K is provided at the right end of the housing **44** of the drum unit **31**K. That is, the discharge guide portion **43**K is provided in the drum unit **31**K. The discharge guide portion **43**K guides the waste toner that has been removed by the drum cleaning device **42** in the drum unit **31**K and conveyed to the right end of the housing **44**, to the inlet **114** of the lower storage portion **72** of the toner container **3**K. The discharge guide portion **43**K and the discharge guide portion **43**M have some components in common. As a result, the components common to these portions are assigned the same reference signs, and description thereof is omitted.

The discharge guide portion **43**K differs from the discharge guide portion **43**M in that a receiving port **120** is formed at the top of the discharge guide portion **43**K. The receiving port **120** is an opening from which the waste toner discharged from the belt cleaning device **38** is received. The receiving port **120** is connected to a discharge port **391** of the relay guide portion **39** that is described below. The waste toner that has entered the receiving port **120** is guided to the inlet **114** of the lower storage portion **72** of the toner container **3**K by the discharge guide portion **43**K, together with the waste toner discharged from the drum cleaning device **42**.

As shown in FIG. **21**, the relay guide portion **39** is provided at the right end of the belt cleaning device **38**. The relay guide portion **39** guides the waste toner that has been conveyed to the right end of the housing **383** through the belt cleaning device **38** by the spiral member **382**, to the discharge guide portion **43**K. The discharge port **391** is formed in a lower portion of the relay guide portion **39**, and the discharge port **391** is connected to the receiving port **120** of the discharge guide portion **43**K. With this configuration, the waste toner discharged from the belt cleaning device **38** passes through the relay guide portion **39** and moves downward, and is guided through the discharge port **391** to the receiving port **120**. The waste toner guided to the receiving port **120** passes through the discharge guide portion **43**K, is conveyed further downward by the paddle portions **118** and **119**, passes through the discharge port **431**, the inlet **114**, and a second conveyance guide portion **107** (an example of the second guide portion) of the toner container **3**K, and is guided into the lower storage portion **72** of the toner container **3**K.

As shown in FIG. **4**, four attachment portions **58** for supporting the toner containers **3** in a detachable manner are provided at the right end of the housing **11**. The attachment portions **58** are fixed to a support plate **49** provided at the right end of the housing **11**. Each attachment portion **58** includes a bracket **59** for supporting a corresponding toner container **3**. The toner containers **3** are supported by corresponding brackets **59** in a detachable manner.

In the following, the configuration of the toner container **3**M for magenta is described. FIG. **5** and FIG. **6** show the toner container **3**M and the toner container **3**K disposed next to the toner container **3**M.

The toner container **3**K is larger in outer shape and capacity than the toner container **3**M since the toner container **3**K stores black toner that is used much, but except for this, they have approximately the same configuration. As a result, components of the toner container **3**K that are the same as those of the toner container **3**M are assigned the same reference signs, and description thereof is omitted. In addition, the toner containers **3**Y and **3**C have the same configuration as the toner container **3**M, thus description thereof is omitted.

It is noted that the drawings show the up-down direction D**1**, the front-rear direction D**2** and the left-right direction D**3** based on an attachment attitude of the toner containers **3**M and **3**K when they are attached to the attachment portions **58** (see FIG. **4**). In the following, with respect to the toner containers **3**M and **3**K in the attachment attitude, the up-down direction D**1** is defined as a height direction D**11** of the toner containers **3**M and **3**K, the front-rear direction D**2** is defined as a width direction D**12** of the toner containers **3**M and **3**K, and the left-right direction D**3** is defined as a depth direction D**13** of the toner containers **3**M and **3**K.

As shown in FIG. **5** and FIG. **6**, the toner container **3**M includes a container main body **75**. The container main body **75** is a resin product formed by injection molding a synthetic resin. The container main body **75** is elongated in the height direction D**11**, broad in the width direction D**12**, and shallow in the depth direction D**13**.

The container main body **75** includes an upper case **78** (an example of the first housing) formed in the upper side thereof, a lower case **79** (an example of the second housing) formed in the lower side thereof, and a lid member **76** (an example of the lid member). That is, the upper case **78** is formed in one side (upper side) of the container main body **75** in the height direction D**11** (longitudinal direction), and the lower case **79** is formed in the other side (lower side) of the container main body **75** in the height direction D**11** (longitudinal direction). The upper case **78** and the lower case **79** are integrally formed as the container main body **75**. In the upper case **78**, the storage space **85** for storing the unused toner is provided as a sectioned space. That is, the storage space **85** in the upper storage portion **71** is sectioned by the upper case **78**. In addition, in the lower case **79**, the storage space **86** for storing the waste toner is provided as a sectioned space. That is, the storage space **86** in the lower storage portion **72** is sectioned by the lower case **79**.

The upper case **78** and the lower case **79** are separated from each other in the up-down direction D**1**, and a gap **88** (see FIG. **7**) having a predetermined distance is formed between the upper case **78** and the lower case **79**. Specifically, as shown in FIG. **7** and FIG. **12**, the upper case **78** includes a bottom wall **782** that constitutes the bottom wall surface thereof and is formed in an arc shape, and the lower case **79** includes a top wall **792** that constitutes the top wall surface thereof. The gap **88** is formed between the bottom wall **782** and the top wall **792**. Here, the bottom wall **782** and the top wall **792** are an example of the pair of walls that are separated from each other in the height direction D**11**.

An opening portion **81** is formed in the right side surface of the upper case **78**, and an opening portion **82** is formed in the right side surface of the lower case **79**. The opening portions **81** and **82** are formed on the same plane. A flange **83** is formed along opening edges of the opening portions **81** and **82**. The flange **83** is formed in the shape of a plate having a thickness in the depth direction D**13**. The flange **83** includes a peripheral flange **831** and a central flange **832** (an example of the coupling member and the common flange). The peripheral flange **831** is formed around the outer peripheral edge of the right side surface of the container main body **75**. The central flange **832** is, as shown in FIG. **12**, formed at a position corresponding to the gap **88** so as to couple the bottom wall **782** of the upper case **78** with the top wall **792** of the lower case **79**. More specifically, the central flange **832** is continued from the lower edge of the opening portion **81** to the upper edge of the opening portion **82**. In other words, the central flange **832** is a flange common to the opening portion **81** and the opening portion **82**. In the present embodiment, the bottom wall **782** and the top wall **792** extend from the central flange **832** in the depth direction D**13**.

The lid member **76** is a resin product formed by injection molding a synthetic resin. As shown in FIG. **5**, the lid member **76** covers the opening portion **81** and the opening portion **82**. The lid member **76** is a flat plate-like member and is formed in the shape that matches the peripheral shape of the flange **83**. In a state where an outer peripheral edge **761** of the lid member **76** is aligned with the flange **83**, the outer peripheral edge **761** and the flange **83** are welded.

FIG. **14** and FIG. **15** are perspective views showing a configuration on the side of the inner surface **762** of the lid member **76**. FIG. **14** and FIG. **15** show attitudes of the stirring member **91** and the spiral member **95** when they are supported by the container main body **75**. As shown in FIG. **14** and FIG. **15**, a plurality of ribs **77** are provided on the inner surface **762** of the lid member **76**. The ribs **77** are integrally formed with the lid member. The plurality of ribs **77** are used for positioning of the lid member **76** to the upper case **78** and the lower case **79**, and are provided in the vicinity of the outer peripheral edge **761** of the lid member **76**. During a process of fitting the outer peripheral edge **761** of the lid member **76** to the flange **83**, the ribs **77** get into the inside of the opening portions **81** and **82**. By this way, the ribs **77** guide the lid member **76** with respect to the opening portions **81** and **82** so that the outer peripheral edge **761** of the lid member **76** is exactly fitted to the flange **83**.

As shown in FIG. **15**, a rib **771** (an example of the rib member), which is one of the plurality of ribs **77**, projects longer than the other ribs **77** from the inner surface **762**. The rib **771** contacts an inner surface of the top wall **792** (see FIG. **12**) of the lower case **79**, and guides the lid member **76** with respect to the opening portions **81** and **82**. Here, the top wall **792** is an example of the partition wall provided between the upper storage portion **71** and the lower storage portion **72**. The rib **771** includes a base plate **7711** and a pair of side plates **7712** and **7713**, wherein the base plate **7711** is parallel to the width direction D**12**, and the side plates **7712** and **7713** extend downward from opposite ends of the base plate **7711** in the width direction D**12**. In the width direction D**12**, the side plate **7712** is located on the front side, and the side plate **7713** is located on the rear side. In addition, the rib **771** is disposed in proximity to a boss **185** provided on the inner surface **762** of the lid member **76**, wherein the boss **185** is described below. Specifically, the rib **771** is located in the

diagonally upper front of the boss **185** with a small gap therebetween. The boss **185** rotatably supports an end portion **1091** of a spiral member **108** on the lid member **76** side, wherein the spiral member **108** is described below. That is, the rib **771** is provided adjacent to the spiral member **108**.

With the opening portion **81** and the opening portion **82** being closed by one lid member **76**, the upper storage portion **71** having the storage space **85** and the lower storage portion **72** having the storage space **86** are provided. In this way, since the upper storage portion **71** and the lower storage portion **72** are coupled with each other by the central flange **832** and the lid member **76**, in the toner container **3**M, a portion around the gap **88** is smaller in strength than the other portions. As a result, the toner container **3**M can be easily bent at the vicinity of the gap **88** in the width direction D**12** and in the depth direction D**13**, and can be easily bent in the rotation direction around the height direction D**11** as the axis of rotation.

As shown in FIG. **7** and FIG. **12**, a plate-like reinforcing rib **751** is disposed between the bottom wall **782** of the upper case **78** and the top wall **792** of the lower case **79**. The reinforcing rib **751** extends in the depth direction D**13** vertically from the central flange **832**. As shown in FIG. **12**, the reinforcing rib **751**, coupled with the bottom wall **782** and the top wall **792**, is a plate-like member having a thickness in the width direction D**12**. As shown in FIG. **7**, the left-end surface of the reinforcing rib **751** is inclined diagonally upward left from the top wall **792** to the bottom wall **782**, and more specifically, inclined in a curved shape. With the provision of the reinforcing rib **751** as such, the strength at the vicinity of the gap **88** between the upper storage portion **71** and the lower storage portion **72** is reinforced. As a result, the toner container **3**M is prevented from being excessively bent at the vicinity of the gap **88**, in particular, prevented from being excessively bent in the depth direction D**13**.

As shown in FIG. **8** and FIG. **11**, the lower storage portion **72** of the toner container **3**M is larger in size in the depth direction D**13** than the upper storage portion **71**. That is, the size in the depth direction D**13** of the lower storage portion **72** of the toner container **3**M is larger than that of the upper storage portion **71**. In addition, the size in the height direction D**11** of the upper storage portion **71** is larger than that of the lower storage portion **72**, and the upper storage portion **71** and the lower storage portion **72** have approximately the same size in the width direction D**12**. In the configuration where the upper storage portion **71** and the lower storage portion **72** are separate in the up-down direction D**1**, there may be a case where each of the upper storage portion **71** and the lower storage portion **72** cannot secure an enough capacity for storing toner. However, with the above-described configuration where the upper storage portion **71** and the lower storage portion **72** have different sizes in the height direction D**11** and the depth direction D**13**, it is possible to secure an enough capacity for each of the upper storage portion **71** and the lower storage portion **72** in spite of various constraints in the attachment to the attachment portion **58**.

As shown in FIG. **6**, the upper storage portion **71** includes a stirring member **91** (an example of the third rotation member) and a first conveyance portion **92**. Specifically, a paddle-like stirring member **91** is provided in the upper storage space **85**. The stirring member **91** is supported by the upper case **78** so as to be rotatable in the storage space **85**. In addition, the first conveyance portion **92** for conveying toner to the developing device **33** is provided in the storage space **85**.

The stirring member **91** is a rotation member rotatably supported by the upper storage portion **71**. By rotating upon receiving a driving force from outside, the stirring member **91** stirs the unused toner stored in the upper storage portion **71**. As shown in FIG. **11**, FIG. **14**, and FIG. **15**, the stirring member **91** is provided in parallel to a spiral member **95** that is described below. The stirring member **91** roughly includes a rotation shaft member **911** (an example of the third rotation shaft and the stirring rotation shaft), and a film-like paddle portion **912** (an example of the film member).

As shown in FIG. **11**, the rotation shaft member **911** is rotatably provided in the storage space **85** of the upper storage portion **71**. The rotation shaft member **911** is a shaft member elongated in the depth direction D**13**. An end portion **161** (an example of the third end portion) of the rotation shaft member **911** located in one side in the axial direction (the lid member **76** side) is rotatably supported by the inner surface **762** of the lid member **76** that constitutes a right wall surface of the upper storage portion **71**. Specifically, a bearing portion **171** (an example of the third bearing portion, see FIG. **16**) is integrally formed with the inner surface **762** of the lid member **76**, and the end portion **161** is rotatably supported by the bearing portion **171**. In addition, an end portion **162** of the rotation shaft member **911** located in the other side (the opposite side) in the axial direction is rotatably supported by an inner surface **785** of a left side wall of the upper case **78** (the attachment portion **58** side). Specifically, a bearing portion **172** is integrally formed with the inner surface **785** of the upper case **78**, and the end portion **162** is rotatably supported by the bearing portion **172**. By this way, the rotation shaft member **911** is rotatably supported in the storage space **85**.

As shown in FIG. **14** and FIG. **15**, the rotation shaft member **911** includes a base portion **160** as a shaft main body. The base portion **160** is a plate-like member extending in the depth direction D**13**. The end portion **161** is provided on the lid member **76** side of the base portion **160**, and the end portion **162** is provided on the opposite side of the base portion **160**. The rotation shaft member **911** is a resin product in which the base portion **160**, the end portion **161** and the end portion **162** are integrally formed.

FIG. **16** is an enlarged view of a main part X**1** that is enclosed by a two-dot chain line in FIG. **11**. As shown in FIG. **16**, the end portion **161** is an annular concave recess portion recessed from an end surface on the lid member **76** side to the opposite side (the inner surface **785** side) along the axial direction of the rotation shaft member **911**. Hereinafter, the end portion **161** is referred to as a concave recess portion **161**. An inner surface of a concave portion **1611** of the concave recess portion **161** is formed in an annular shape. In the present embodiment, the base portion **160** is joined to an outer peripheral edge portion of the concave recess portion **161**. An engagement opening **1631** (an example of the second engagement opening) is formed in a bottom portion **163** of the concave recess portion **161**, wherein the engagement opening **1631** penetrates in the axial direction of the rotation shaft member **911**. The engagement opening **1631** is formed in a rectangular shape, for example.

The bearing portion **171** includes a boss **173** (an example of the second boss) projecting vertically from the inner surface **762** of the lid member **76**. The boss **173** has a cylindrical shape. The boss **173** is inserted in the concave portion **1611** of the concave recess portion **161**, thereby the concave recess portion **161** is rotatably supported by the boss **173**. It is noted that a through hole **174** (an example of the second through hole) is formed at the center of a

projection end of the boss **173**, wherein a second coupling portion **1922** of a second transmission portion **192** described below can be inserted through the through hole **174**.

As shown in FIG. **11**, the end portion **162** is a disk-shaped member. The end portion **162** is joined to the base portion **160** in a vertical direction thereto in such a way as to face the concave recess portion **161**. A circular shaft hole **1621** (see FIG. **14**) is formed at the center of the end portion **162**. The bearing portion **172** is a boss projecting from the inner surface **785** of a left side wall of the upper case **78** (the attachment portion **58** side). The bearing portion **172** has a cylindrical shape. The bearing portion **172** is inserted in the shaft hole **1621**, thereby the end portion **162** is rotatably supported by the bearing portion **172**.

As shown in FIG. **14** and FIG. **15**, the base portion **160** includes two support pieces **165**. The support pieces **165** are provided to support the paddle portion **912**. The two support pieces **165** are disposed on the base portion **160** with an interval in the axial direction. The support pieces **165** are plate pieces (support pieces) disposed to form a small gap between itself and a side surface of the base portion **160**, and an edge of the paddle portion **912** is inserted in the small gap and fixed there.

The paddle portion **912** is a film member formed as a thin film. The paddle portion **912** is made of an elastic, synthetic resin material, such as a polyester or a PET (polyethylene terephthalate) resin. When the stirring member **91** is rotated, the paddle portion **912** contacts and stirs the unused toner stored in the upper storage portion **71**. The paddle portion **912** includes a main body portion **9121** and a projection portion **9122**, wherein the main body portion **9121** is attached to the support pieces **165** of the base portion **160**, and the projection portion **9122** projects from an end of the main body portion **9121** on the lid member **76** side toward the inner surface **762**. Specifically, the projection portion **9122** extends from a peripheral edge of a bottom portion **1885** of a second storage portion **1882** described below to the inner surface **762** in such a way as to avoid a step between the inner surface **762** and the bottom portion **1885**.

With the above-described configuration of the stirring member **91**, when a rotational driving force is input to the rotation shaft member **911**, the stirring member **91** is rotated in one direction in the storage space **85**. In the present embodiment, the stirring member **91** is rotated in a rotation direction D**31** shown in FIG. **14**. This allows the paddle portion **912** to stir the unused toner in the storage space **85**. In particular, since the above-described projection portion **9122** is provided in the paddle portion **912**, unused toner that is present in a region from the bottom portion **1885** of the second storage portion **1882** described below to the inner surface **762** is stirred by the projection portion **9122** in a reliable manner.

As shown in FIG. **7** and FIG. **8**, the first conveyance portion **92** includes a first conveyance guide portion **94** and a spiral member **95**, wherein the first conveyance guide portion **94** is cylindrical and extends outward from a wall surface **781** (an example of the facing surface) of the left side of the upper case **78**, and the spiral member **95** (an example of the first rotation member and the second conveyance member, see FIG. **10**) is provided in the inside of the first conveyance guide portion **94**. The first conveyance guide portion **94** is integrally formed with the upper case **78** in the shape of a cylinder whose center is the same as the rotation center of the spiral member **95**. Here, the wall surface **781** is located in one side of the toner container **3**M with respect to the attachment portion **58** in the depth direction D**13**, and is a surface that faces the attachment portion **58** when the toner container **3**M is attached to the attachment portion **58**. It is noted that the depth direction D**13** matches the direction in which the toner container **3**M is attached to and detached from the attachment portion **58**.

The spiral member **95** is rotatably provided in the upper storage portion **71**, and as shown in FIG. **10**, extends in the depth direction D**13** that is perpendicular to the height direction D**11**. The spiral member **95** is a conveyance member that conveys the unused toner in the storage space **85** toward the attachment portion **58** (see FIG. **4**) through the inside of the first conveyance guide portion **94**. In addition, the first conveyance guide portion **94** is a guide member that guides the unused toner conveyed by the spiral member **95** to the developing device **33**.

As shown in FIG. **10**, the spiral member **95** includes blades **97** of a spiral shape around a rotation shaft **96**. An end portion **961** (an example of the first end portion) of the rotation shaft **96** of the spiral member **95** on the lid member **76** side is rotatably supported by a bearing portion **99** (an example of the first bearing portion) that is integrally formed with an inner surface **762** of the lid member **76**. In addition, in a state where the spiral member **95** is inserted in the first conveyance guide portion **94**, the opposite end of the rotation shaft **96** is rotatably supported by the first conveyance guide portion **94**. Specifically, a first input portion **98** (an example of the first drive input portion and the second input joint) is integrally formed with an end portion **962** that is the opposite end of the rotation shaft **96**, wherein the first input portion **98** receives a rotational driving force input from outside. In addition, a through hole **941** (an example of the second bearing hole) is formed in the tip of the first conveyance guide portion **94**. In the state where the first input portion **98** projects from the through hole **941** to the outside, the end portion **962** is rotatably supported by the through hole **941**.

In the following, the support structure of the end portion **961** of the spiral member **95** is described concretely with reference to FIG. **17**. Here, FIG. **17** is an enlarged view of a main part X**2** that is enclosed by a two-dot chain line in FIG. **10**.

As shown in FIG. **17**, the end portion **961** of the rotation shaft **96** (an example of the first rotation shaft) includes an inner hole **178** that extends along the axial direction from an end surface of the rotation shaft **96** on the lid member **76** side toward the opposite side. That is, the end portion **961** is a cylinder portion formed in a cylindrical shape so as to have the inner hole **178** in its inside. The inner hole **178** is formed in a size by which a first coupling portion **1912** of a first transmission portion **191** described below can be inserted therethrough. On an end surface of the end portion **961** on the lid member **76** side, an arc-shaped support portion **179** whose outer diameter is larger than the inner hole **178** is formed. It is noted that an engagement opening **9611** (an example of the first engagement opening) is formed on an outer circumferential surface of the end portion **961**, wherein a first engaging portion **197** described below is engaged with the engagement opening **9611** when the first coupling portion **1912** described below is inserted through the inner hole **178**. The engagement opening **9611** is inserted through the inner hole **178** of the end portion **961**.

In addition, as described above, the bearing portion **99** is provided on the inner surface **762** of the lid member **76**. The bearing portion **99** includes a boss **180** (an example of the first boss) that projects vertically from the inner surface **762** of the lid member **76**. The boss **180** is inserted in the support portion **179** of the end portion **961**, thereby the end portion **961** is supported by the boss **180**. It is noted that a through

hole **181** (an example of the first through hole) is formed at the center of a projection end of the boss **180**, wherein the first coupling portion **1912** of the first transmission portion **191** described below can be inserted through the through hole **181**.

With the above-described configuration of the bearing portion **99** and the end portion **961**, when a rotational driving force is input to the rotation shaft **96** of the spiral member **95**, the spiral member **95** is rotated in one direction in the storage space **85**. In the present embodiment, when a rotational driving force is input to the first input portion **98**, the spiral member **95** is rotated in a rotation direction D**30** shown in FIG. **12**. This allows the unused toner in the storage space **85** to be conveyed in the first conveyance guide portion **94** toward the tip portion of the first conveyance guide portion **94**.

As shown in FIG. **10**, a toner discharge port **100** for discharging toner stored in the storage space **85** to outside is formed in a lower region of an outer circumferential surface (hereinafter merely referred to as a lower surface) of the first conveyance guide portion **94**. The toner discharge port **100** is a through-opening that penetrates, vertically downward, an outer circumferential wall constituting the lower surface of the first conveyance guide portion **94**. The toner discharge port **100** is formed in an approximately square shape. In the present embodiment, the toner discharge port **100** is formed in an end portion of the lower surface of the first conveyance guide portion **94** at a position closest to the first input portion **98**.

In addition, as shown in FIG. **8**, the first conveyance guide portion **94** includes an inclined guide portion **942**. The inclined guide portion **942** is integrally formed with the first conveyance guide portion **94**, and is formed in an upper region of the arc-shaped circumferential surface (hereinafter merely referred to as an upper surface) of the first conveyance guide portion **94**. The inclined guide portion **942** is, in the upper surface of the first conveyance guide portion **94**, an inclined surface that is inclined diagonally downward toward the tip of the first conveyance guide portion **94** in the extension direction of the first conveyance guide portion **94** (toward the right in FIG. **10**). The inclined guide portion **942** is formed in an end portion of the upper surface of the first conveyance guide portion **94** at a position closest to the first input portion **98**, and is formed above the toner discharge port **100** in a side view (see FIG. **10**). In the present embodiment, the inclined guide portion **942** is inclined downward at an inclination angle of 10 degrees from the upper surface of the first conveyance guide portion **94**.

With the provision of the above-described inclined guide portion **942** in the first conveyance guide portion **94**, an inner surface **9421** of the inclined guide portion **942** functions as a guide surface to guide the unused toner to the toner discharge port **100** in the inside of the first conveyance guide portion **94**. As a result, when the unused toner is conveyed by the spiral member **95** along an arrow D**32** of FIG. **10** toward the toner discharge port **100**, the unused toner contacts the inner surface **9421**, so that the advancing direction of the unused toner is oriented diagonally downward and the unused toner is guided toward the toner discharge port **100**. With this configuration, the unused toner is prevented from remaining at the upper side of the tip portion of the spiral member **95** without being discharged. That is, it is possible to reduce a residual amount of the unused toner that remains unused in the tip portion of the first conveyance guide portion **94**. In addition, since the inclination angle of the inclined guide portion **942** is 10 degrees, the unused toner is guided smoothly toward the toner discharge port **100** without excessively aggregating.

In the present embodiment, as shown in FIG. **12**, the inclined guide portion **942** is formed on the upper surface of the first conveyance guide portion **94** at a position that is away by a predetermined angle θ from a vertical plane passing the rotation center of the spiral member **95** toward the upstream in the rotation direction D**30**. In the present embodiment, the predetermined angle θ is 45 degrees. That is, the inclined guide portion **942** is formed on the upper surface of the inclined guide portion **942** at a position that is away by 45 degrees from the vertical plane toward the upstream in the rotation direction D**30**. With the inclined guide portion **942** provided at such a position, the unused toner scraped up by the blades **97** contacts the inner surface **9421** and moves along the width direction D**12** in the first conveyance guide portion **94**. When the unused toner goes beyond the rotation shaft **96** of the spiral member **95**, the unused toner falls down and is oriented toward the toner discharge port **100**. This allows the unused toner to be guided to the toner discharge port **100** without receiving un excessive stress.

In addition, on the lower surface of the first conveyance guide portion **94**, a shutter member **101** (an example of the opening and closing member) for opening and closing the toner discharge port **100** is provided. The shutter member **101** is supported by the first conveyance guide portion **94** in such a manner that the shutter member **101** can slide the lower surface of the first conveyance guide portion **94** in the longitudinal direction (the left-right direction of FIG. **10**) of the first conveyance guide portion **94**.

In the present embodiment, when the toner container **3**M is attached to the attachment portion **58** (see FIG. **4**), the shutter member **101** is moved from a closing position of closing the toner discharge port **100**, to an opening position of opening the toner discharge port **100**.

In addition, the toner discharge port **100** is aligned with the supply port **56** of the developing device **33** for positioning, then the toner discharge port **100** is connected to the supply port **56** so that toner can be supplied from the toner discharge port **100** to the supply port **56**. In addition, the first input portion **98** is coupled with a first output joint **61** (an example of the drive output portion and the second drive coupling portion, see FIG. **13**) that is provided in the attachment portion **58**, and a rotational driving force output from a drive source such as a motor is transmitted to the first input portion **98**. Upon receiving the rotational driving force, the spiral member **95** is rotated, and the toner in the storage space **85** is conveyed from the toner discharge port **100** to the supply port **56** via the first conveyance guide portion **94**, and is supplied to the inside of the developing device **33**.

It is noted that an engagement hole **611** which is rectangular in a cross section (see FIG. **13**) is formed in the first output joint **61**. The first input portion **98** is inserted in the engagement hole **611**, thereby the first output joint **61** is engaged with the first input portion **98** in a direction of rotation around the axis. This allows the rotational driving force received from the first output joint **61** to be transmitted to the first input portion **98**. In this case, the first input portion **98** is an example of the engaging portion.

As shown in FIG. **13**, the first output joint **61** is provided in the attachment portion **58**. The first output joint **61** is a drive output portion configured to output the rotational driving force that is output from a drive source such as a motor provided in the image forming apparatus **10**, to the outside. The first output joint **61** is coupled with the first

input portion **98** in the left-right direction D**3** when the toner container **3**M is attached to the attachment portion **58**.

As shown in FIG. **5** and FIG. **9**, a gear transmission mechanism **103** (an example of the transmission mechanism) is provided in the lid member **76**. The gear transmission mechanism **103** is coupled with the rotation shaft **96** of the spiral member **95** and with a rotation shaft member **911** of the stirring member **91** in the state where the lid member **76** closes the opening portions **81** and **82**. With this configuration, the rotational driving force transmitted from the first input portion **98** to the spiral member **95** is transmitted to the stirring member **91** by the gear transmission mechanism **103**. That is, with the provision of the gear transmission mechanism **103**, when the rotational driving force is input to the first input portion **98**, the spiral member **95** and the stirring member **91** are rotated interlocking with each other.

The following describes the configuration of the gear transmission mechanism **103** with reference to FIG. **14** to FIG. **18**.

The gear transmission mechanism **103** transmits the rotational driving force input to the rotation shaft **96** of the spiral member **95**, from the end portion **961** of the rotation shaft **96** to the stirring member **91** via the concave recess portion **161** (end portion **161**) of the rotation shaft member **911** of the stirring member **91**. As shown in FIG. **18**, the gear transmission mechanism **103** includes the first transmission portion **191**, the second transmission portion **192**, and an idle gear **193** provided between the first transmission portion **191** and the second transmission portion **192**.

The first transmission portion **191** includes a first gear **1911** and the first coupling portion **1912**. The first transmission portion **191** is a resin product in which the first gear **1911** and the first coupling portion **1912** are integrally formed.

The second transmission portion **192** includes a second gear **1921** and the second coupling portion **1922**. The second transmission portion **192** is a resin product in which the second gear **1921** and the second coupling portion **1922** are integrally formed.

In the present embodiment, the first gear **1911**, the second gear **1921** and the idle gear **193** are disposed on the surface of the lid member **76**. Specifically, the first gear **1911**, the second gear **1921** and the idle gear **193** are rotatably stored in a gear storage portion **188** of a concave shape (an example of the storage concave portion of a concave shape) formed on the surface of the lid member **76**, in a state where the gears mesh with each other and the rotational force can be transmitted. The gear storage portion **188** is a concave portion recessed from the surface of the lid member **76** toward the inner surface **762** of the lid member. The first gear **1911**, the second gear **1921** and the idle gear **193** are stored more on the inner side of the concave portion of the gear storage portion **188** than the surface of the lid member **76**. That is, the first gear **1911**, the second gear **1921** and the idle gear **193** are stored in the gear storage portion **188** in a state of being embedded in the inside of the gear storage portion **188**. As a result, the gears **1911**, **1921** and **193** keep the state of not projecting from the surface of the lid member **76** to outside.

The toner container **3**M is gripped by the user during an attachment work to the attachment portion **58** or a replacement work. Accordingly, in a case where, for example, a rotational driving force is erroneously transmitted to the first input portion **98** and the gears **1911**, **1921** and **193** are rotated when the user is detaching the toner container **3**M from the image forming apparatus **10**, the user may be injured by putting his/her fingers between the gears **1911**, **1921** and **193**. In addition, even if the gear transmission mechanism **103** is not operating, lubricant such as grease applied to the gears **1911**, **1921** and **193** may adhere to the user's fingers and the fingers may be smeared. Furthermore, when the user grips the toner container **3**M, the gears **1911**, **1921** and **193** may be pushed by the user's fingers and positionally shifted, resulting in a damage of the gear transmission mechanism **103** during the driving. However, since the gears **1911**, **1921** and **193** of the gear transmission mechanism **103** are stored in the gear storage portion **188**, the user's fingers are prevented from touching the gears **1911**, **1921** and **193**. In particular, the user's fingers are prevented from touching the teeth of the gears **1911**, **1921** and **193**. As a result, it is possible to realize the toner container **3**M that is free from the above-mentioned problems, has a low possibility of failure, and is safe.

As shown in FIG. **17**, the first gear **1911** is disposed in a first storage portion **1881** that is provided in the gear storage portion **188**. On an inner side surface of the first storage portion **1881**, the bearing portion **99** is integrally formed therewith. The through hole **181** of the bearing portion **99** passes through up to the first storage portion **1881**.

The first coupling portion **1912** extends from the first gear **1911** to the storage space **85** of the upper storage portion **71** via the through hole **181** formed in the bearing portion **99**, and is coupled with the spiral member **95** of the first conveyance portion **92**. Specifically, the first coupling portion **1912** includes a first shaft portion **196** and the first engaging portion **197**, wherein the first shaft portion **196** is provided at the center of the first gear **1911** in a vertical direction thereto, and the first engaging portion **197** is provided on the tip side of the first shaft portion **196**. In the state where the first gear **1911** is disposed in the first storage portion **1881**, the first shaft portion **196** is inserted through the through hole **181** to the storage space **85** side, and is further inserted through the inner hole **178** of the end portion **961**. The first engaging portion **197** is a hook-like member that projects outward from an outer circumferential surface of the first shaft portion **196** and extends toward the first gear **1911**. In the present embodiment, the first engaging portion **197** is coupled with the engagement opening **9611** of the end portion **961** by the so-called snap-fitting system.

The first engaging portion **197** has elasticity in a radial direction vertical to the axial direction of the first shaft portion **196**. Accordingly, when the first shaft portion **196** is inserted through the inner hole **178**, the first engaging portion **197** receives a force in the radial direction from the inner wall of the end portion **961**, and the first engaging portion **197** is elastically deformed toward the first shaft portion **196**. As a result, the first shaft portion **196** can be inserted through the inner hole **178** without being interrupted by the first engaging portion **197**. When the first shaft portion **196** is inserted through to the innermost part of the inner hole **178** and the first engaging portion **197** reaches the engagement opening **9611**, the first engaging portion **197** is released from the elastic deformation, and returns to the original attitude. At this time, the first engaging portion **197** projects from the engagement opening **9611** to outside of the end portion **961**, and an end portion of the first engaging portion **197** on the first gear **1911** side is engaged with an edge portion **9612** of the engagement opening **9611**. This allows the first transmission portion **191** to be coupled with the rotation shaft **96** of the spiral member **95** by the first shaft portion **196** and the first engaging portion **197**.

As shown in FIG. **16**, the second gear **1921** is disposed in a second storage portion **1882** (an example of the second

gear storage portion) that is provided in the gear storage portion **188**. On an inner side surface of the second storage portion **1882**, the boss **173** of the bearing portion **171** is integrally formed therewith. The through hole **174** of the boss **173** passes through up to the second storage portion **1882**.

The second coupling portion **1922** extends from the second gear **1921** to the storage space **85** of the upper storage portion **71** via the through hole **174** formed in the boss **173** of the bearing portion **171**, and is coupled with the rotation shaft member **911** of the stirring member **91**. Specifically, the second coupling portion **1922** includes a second shaft portion **206** and a second engaging portion **207**, wherein the second shaft portion **206** is provided at the center of the second gear **1921** in a vertical direction thereto, and the second engaging portion **207** is provided on the tip side of the second shaft portion **206**. In the state where the second gear **1921** is disposed in the second storage portion **1882**, the second shaft portion **206** is inserted through the through hole **174** to the storage space **85** side, and is further inserted through the engagement opening **1631** of the concave recess portion **161**. The second engaging portion **207** includes two hooks that project outward from a side surface of the tip portion of the second shaft portion **206** and extends toward the second gear **1921**. In the present embodiment, the second engaging portion **207** is coupled with the engagement opening **1631** of the concave recess portion **161** by the so-called snap-fitting system.

The second engaging portion **207** has elasticity in a radial direction vertical to the axial direction of the second shaft portion **206**. Accordingly, when the second shaft portion **206** is inserted through the engagement opening **1631** via the through hole **174**, the second engaging portion **207** receives a force in the radial direction from an edge portion **1632** of the engagement opening **1631**, and the second engaging portion **207** is elastically deformed toward the second shaft portion **206**. As a result, the second shaft portion **206** can be inserted through the engagement opening **1631** without being interrupted by the second engaging portion **207**. When the second engaging portion **207** goes beyond the engagement opening **1631**, the second engaging portion **207** is released from the elastic deformation, and returns to the original attitude. At this time, the second engaging portion **207** is engaged with the edge portion **1632** of the engagement opening **1631**. This allows the second transmission portion **192** to be coupled with the rotation shaft member **911** of the stirring member **91** by the second shaft portion **206** and the second engaging portion **207**.

As shown in FIG. **17**, the idle gear **193** is disposed in a third storage portion **1883** that is provided in the gear storage portion **188**. As shown in FIG. **18**, the idle gear **193** is disposed between the first gear **1911** and the second gear **1921**, and meshes with the first gear **1911** and the second gear **1921**.

With the above-described configuration of the gear transmission mechanism **103**, the rotational driving force transmitted from the first input portion **98** to the spiral member **95** is transmitted to the stirring member **91** by the gear transmission mechanism **103**. By this way, when the spiral member **95** rotates, the stirring member **91** also rotates in the same direction as the spiral member **95**.

It is noted that in the present embodiment, as shown in FIG. **14** and FIG. **15**, a first inclined guide portion **194** and a second inclined guide portion **195** (both are examples of the inclined guide portion) are provided on the inner surface **762** of the lid member **76** in the vicinity of the gear storage portion **188**. The inclined guide portions **194** and **195** are integrally formed with the lid member **76**. The inclined guide portions **194** and **195** are provided in a rotational region of the projection portion **9122** on the inner surface **762** of the lid member **76**. Specifically, as shown in FIG. **14**, the first inclined guide portion **194** extends from an end portion **188**A of the bottom portion **1885** of the gear storage portion **188** on the upstream side in the rotation direction D**31**, to the inner surface **762**, and has an inclined surface that extends from the inner surface **762** to the bottom portion **1885** of the gear storage portion **188**. In addition, as shown in FIG. **15**, the second inclined guide portion **195** extends from an end portion **188**B of the bottom portion **1885** of the gear storage portion **188** on the downstream side in the rotation direction D**31**, to the inner surface **762**, and has an inclined surface that extends from the inner surface **762** to the bottom portion **1885** of the gear storage portion **188**.

With the provision of the above-described inclined guide portions **194** and **195** on the inner surface **762**, when the stirring member **91** rotates upon receiving the rotational driving force from the gear transmission mechanism **103**, the projection portion **9122** of the stirring member **91** smoothly moves on the inclined surfaces of the inclined guide portions **194** and **195** while being bent along the inclined surfaces of the inclined guide portions **194** and **195**. In addition, in a case where the unused toner stored in the upper storage portion **71** is reduced to a small amount, the projection portion **9122** can convey unused toner near the first inclined guide portion **194** to the spiral member **95** in a reliable manner. As a result, it is possible to prevent the unused toner from wastefully remaining in the upper storage portion **71**. In addition, since the first inclined guide portion **194** is provided in a lower portion of the inner surface **762**, it is possible to prevent the unused toner from aggregating in the lower portion of the storage space **85** of the upper storage portion **71**.

As shown in FIG. **6**, the lower storage portion **72** includes a second conveyance portion **105**. Specifically, the second conveyance portion **105** for conveying the waste toner discharged from a drum unit **31** for magenta to the inside of the storage space **86** is provided in the storage space **86**. The second conveyance portion **105** includes a second conveyance guide portion **107** and the spiral member **108**, wherein the second conveyance guide portion **107** is cylindrical, extends outward from a wall surface **791** of the left side of the lower case **79**, and includes a toner conveyance path in its inside, and the spiral member **108** (an example of the second rotation member, the rotation member, and the first conveyance member, see FIG. **11**) is provided in the inside of the second conveyance guide portion **107**. The second conveyance guide portion **107** is integrally formed with the lower case **79**.

The spiral member **108** is rotatably provided in the inside of the lower storage portion **72**, and as shown in FIG. **11**, extends in the depth direction D**13** perpendicular to the height direction D**11**. The spiral member **108** is a conveyance member that conveys the waste toner that has been discharged from the drum unit **31** to the second conveyance guide portion **107**, to the storage space **86** through the inside of the second conveyance guide portion **107**. In addition, the second conveyance guide portion **107** is a guide member that receives the waste toner from the drum unit **31**, and guides the waste toner conveyed by the spiral member **108** to the inside of the storage space **86**.

As shown in FIG. **11**, the spiral member **108** includes spiral blades **110** around a rotation shaft **109**. An end portion **1091** (an example of the second end portion) of the rotation shaft **109** of the spiral member **108** on the lid member **76**

side is rotatably supported by a bearing portion **112** (an example of the second bearing portion) that is integrally formed with the inner surface **762** of the lid member **76**. In addition, in a state where the spiral member **108** is inserted in the second conveyance guide portion **107**, the opposite end of the rotation shaft **109** is rotatably supported by the second conveyance guide portion **107**. Specifically, a second input portion **111** (an example of the second drive input portion and the first input joint) is mounted on an opposite end portion **1092** of the rotation shaft **109**, wherein the second input portion **111** receives a rotational driving force input from outside.

In addition, the tip portion of the second conveyance guide portion **107** has a through hole **1071** (an example of the first bearing hole and the bearing hole). Through the through hole **1071**, the end portion **1092** of the rotation shaft **109** of the spiral member **108** passes through from the tip portion of the second conveyance guide portion **107** to outside, and the through hole **1071** rotatably supports the rotation shaft **109**. With this configuration, the end portion **1092** is rotatably supported in the second conveyance guide portion **107** in the state where the rotation shaft **109** projects to outside from the through hole **1071**. The second input portion **111** is attached to the end portion **1092**. The second input portion **111** is fixed to the end portion **1092** from outside in the state where the end portion **1092** is passed through the through hole **1071** to outside.

In the following, the support structure of the end portion **1091** of the spiral member **108** is described concretely with reference to FIG. **19**. Here, FIG. **19** is an enlarged view of a main part X**3** that is enclosed by a two-dot chain line in FIG. **11**.

As shown in FIG. **19**, the end portion **1091** of the rotation shaft **109** (an example of the second rotation shaft) includes an inner hole **184** that extends along the axial direction from an end surface of the rotation shaft **109** on the lid member **76** side toward the opposite side. The inner hole **184** is formed in a circular shape.

In addition, as described above, the bearing portion **112** is provided on the inner surface **762** of the lid member **76**. The bearing portion **112** includes a boss **185** that projects vertically from the inner surface **762** of the lid member **76**. The boss **185** is inserted in the inner hole **184** of the end portion **1091**, thereby the end portion **1091** is rotatably supported by the boss **185**.

With the above-described configuration of the bearing portion **112** and the end portion **1091**, when a rotational driving force is input to the rotation shaft **109** of the spiral member **108**, the spiral member **108** is rotated in one direction in the storage space **86**. In the present embodiment, the spiral member **108** is rotated in a rotation direction D**32** (see FIG. **20**A). This allows the waste toner discharged from the drum cleaning device **42** of the drum unit **31** to be conveyed in the second conveyance guide portion **107** to the storage space **86**.

FIG. **20**A and FIG. **20**B are cross sections taken along an XX-XX line of FIG. **19**. As shown in FIG. **20**A and FIG. **20**B, a film member **127** is formed in the vicinity of the spiral member **108**. The film member **127** is formed as a thin film. The film member **127** is made of an elastic, synthetic resin material, such as a polyester or a PET (polyethylene terephthalate) resin. The film member **127** is formed approximately in a shape of a letter L by bending a film of a rectangular, flat plate shape formed from the synthetic resin material. The film member **127** includes a fixed portion **128** and a contact portion **129**, wherein the fixed portion **128** is attached and fixed to an inner surface of the top wall **792** of the lower case **79**, and the contact portion **129** extends downward from the fixed portion **128**. The film member **127** is formed approximately in a shape of a letter L by the fixed portion **128** and the contact portion **129**.

In the film member **127**, the fixed portion **128** is fixed to the top wall **792** such that the contact portion **129** is disposed between the rib **771** and the spiral member **108**. Specifically, the film member **127** is provided such that the contact portion **129** contacts a side plate **7713** of the rib **771**, and the contact portion **129** contacts an outer circumferential surface of the spiral member **108**. In this way, a side of the contact portion **129** is supported by the side plate **7713**, thus the contact portion **129** contacts the outer circumferential surface of the spiral member **108** in the state where the contact portion **129** has a strong stiffness. As a result, if waste toner adheres to the spiral member **108**, the waste toner is scraped off in a reliable manner by the contact with the contact portion **129**.

In the present embodiment, as shown in FIG. **20**A and FIG. **20**B, a part of the spiral member **108** that contacts the contact portion **129** is formed in an oval shape in a cross section. As a result, when the spiral member **108** is rotated in the rotation direction D**32**, each time the spiral member **108** is rotated by a quarter rotation, the contact portion **129** changes its attitude between a first attitude and a second attitude, wherein in the first attitude (see FIG. **20**A), the contact portion **129** is bent with a lower edge of the side plate **7713** as a fulcrum, and in the second attitude (see FIG. **20**B), the contact portion **129** extends straight vertically downward from the fixed portion **128**. With this configuration, when the spiral member **108** is rotated, the force that presses the outer circumferential surface of the spiral member **108** changes for each quarter rotation. As a result, the waste toner that has adhered to the spiral member **108** is scraped off in a reliable manner by the contact portion **129**.

As shown in FIG. **11**, the inlet **114** for guiding the waste toner to the inside of the storage space **86** is formed on the upper surface of the second conveyance guide portion **107**. In addition, on the upper surface of the second conveyance guide portion **107**, a shutter member **115** for opening and closing the inlet **114** is provided. The shutter member **115** is supported by the second conveyance guide portion **107** such that the upper surface of the second conveyance guide portion **107** can be slid in the longitudinal direction (the left-right direction of FIG. **11**) of the second conveyance guide portion **107**.

In the present embodiment, when the toner container **3**M is attached to the attachment portion **58** (see FIG. **4**), the shutter member **115** is moved from a closing position of closing the inlet **114**, to an opening position of opening the inlet **114**.

In addition, the inlet **114** is aligned with the discharge port **431** of the discharge guide portion **43** for positioning, then the inlet **114** is connected to the discharge port **431** so that waste toner can be conveyed from the discharge port **431** to the inlet **114**. In addition, the second input portion **111** is coupled with a second output joint **62** (an example of the drive output portion and the first drive coupling portion, see FIG. **13**) that is provided in the attachment portion **58**, and a rotational driving force output from a drive source such as a motor is transmitted to the second input portion **111**. Upon receiving the rotational driving force, the spiral member **108** is rotated, and the waste toner that has been discharged from the discharge port **431** and conveyed into the second conveyance guide portion **107** is conveyed to the storage space **86** through the second conveyance guide portion **107**.

As shown in FIG. **13**, the second output joint **62** is provided in the attachment portion **58**, at a position different from the first output joint **61**. The second output joint **62** is a drive output portion configured to output the rotational driving force that is output from a drive source such as a motor provided in the image forming apparatus **10**, to the outside. The second output joint **62** is coupled with the second input portion **111** in the left-right direction D**3** when the toner container **3**M is attached to the attachment portion **58**.

Meanwhile, the spiral member **108** as a conveyance member receives a rotational driving force from the image forming apparatus **10** via shaft joints such as the second output joint **62** and the second input portion **111** in the state where the toner container **3**M is attached to the attachment portion **58** of the image forming apparatus **10**. Specifically, as described above, the second input portion **111** is mounted, as a shaft joint, on the rotation shaft **109** of the spiral member **108**, and the second output joint **62** that is to be coupled with the second input portion **111**, is provided on the attachment portion **58**. During the process in which the toner container **3**M is attached to the attachment portion **58**, the second input portion **111** is coupled with the second output joint **62**. A problem of this configuration is that if the toner container **3**M is inserted not straight but slightly obliquely with respect to the attachment portion **58**, the second input portion **111** may not be coupled with the second output joint **62** correctly. For example, in a configuration where the second output joint **62** includes a plurality of engaging pieces **623** projecting toward the rear surface of the toner container, and the second input portion **111** includes a plurality of projection pieces **113** that can be engaged with the engaging pieces **623** respectively, the projection pieces **113** may not enter the engaging positions corresponding to the engaging pieces **623** and thus the second input portion **111** may not be coupled with the second output joint **62**. If, in such a state, the toner container **3**M is pressed strongly against the attachment portion **58** for the attachment thereto, the second input portion **111** or the second output joint **62** may be damaged. According to the present embodiment, however, with the configuration of the toner container **3**M described below, it is possible to cause the coupling portions that are provided to transmit the driving force, to be coupled with each other in a reliable manner when the toner container **3**M is attached to the attachment portion **58** of the image forming apparatus **10**.

As shown in FIG. **22**A and FIG. **22**B, the second output joint **62** includes a base portion **621** and four engaging pieces **623**. The base portion **621** is a portion that is to be attached to the attachment portion **58**, and is, for example, a disk-like member having a circular shaft hole **624** at its center. The base portion **621** is integrally formed with at least two engaging pieces **623**. In the present embodiment, four engaging pieces **623** are formed on the base portion **621**. The four engaging pieces **623** project from the surface of the base portion **621**. The shaft hole **624** is formed at the center of the base portion **621**, and the four engaging pieces **623** are arranged at equal intervals around the axis of the shaft hole **624**. It is noted that the number of engaging pieces **623** is not limited to four, but, for example, two engaging pieces **623** may be arranged at equal intervals around the shaft hole **624**.

As shown in FIG. **22**B, each of the four engaging pieces **623** includes a first inclined surface **625** and a vertical surface **626**, wherein the first inclined surface **625** is inclined from a projection end of the engaging piece **623** toward the base portion **621**, and the vertical surface **626** is formed on the opposite side to the first inclined surface **625** across the projection end. The vertical surface **626** is vertical to the surface of the base portion **621**.

The projection end of each of the four engaging pieces **623** is formed in a tapered shape. The projection end of each of the engaging pieces **623** has a second inclined surface **627**. The second inclined surface **627** is formed by chamfering a corner portion between the first inclined surface **625** and the vertical surface **626** (the projection end of the engaging piece **623**). The second inclined surface **627** is inclined with respect to both the first inclined surface **625** and the vertical surface **626**. The second inclined surface **627** has a role of, when the second input portion **111** is inserted in the second output joint **62**, guiding a projection piece **113** of the second input portion **111** to a gap **628** between adjacent engaging pieces **623**. For example, when the projection piece **113** contacts the second inclined surface **627**, the projection piece **113** slides on the second inclined surface **627** and enters the gap **628**.

On the other hand, as described above, the second input portion **111** is mounted on the end portion **1092** of the rotation shaft **109** of the spiral member **108**. As shown in FIG. **23**A and FIG. **23**B, the second input portion **111** includes a base portion **1111**, a projection shaft **1112**, and two projection pieces **113**. The base portion **1111** is formed in a disk shape. The projection shaft **1112** is a boss-like member projecting from the center of the base portion **1111** in a vertical direction. An insertion hole is formed at the center of a rear surface of the base portion **1111**, and the insertion hole reaches an inside of the projection shaft **1112**. That is, the inside of the projection shaft **1112** is hollow. A pair of cuts **1114** are formed on the circumferential surface of the projection shaft **1112**. A pair of arms are formed on the end portion **1092** of the rotation shaft **109**, wherein the pair of arms extend in the axial direction, and a hook is formed on the tip of each of the arms. When the pair of arms are inserted in the inside of the projection shaft **1112**, the hooks respectively enter the cuts **1114**. This allows the second input portion **111** to be attached to the end portion **1092** by the so-called snap-fitting system.

Each of the pair of projection pieces **113** is formed so as to be tapered toward the projection end of the projection shaft **1112**. The projection pieces **113** can be engaged with two engaging pieces **623** among the four engaging pieces **623**. In the present embodiment, a projection piece **1131** (an example of the first piece) of the two projection pieces **113** includes an abutting surface **1133** (an example of the first abutting surface) that contacts the vertical surface of an engaging piece **623**. The abutting surface **1133** is a vertical surface vertical to the surface of the base portion **1111**. The other projection piece **1132** (an example of the second piece) of the two projection pieces **113** is formed at a position that is away by 180 degrees from the projection piece **1131** around the axis. The projection piece **1132** includes an abutting surface **1134** (an example of the second abutting surface) that contacts the vertical surface of another engaging piece **623**. The abutting surface **1134** is a vertical surface vertical to the surface of the base portion **1111**. The abutting surfaces **1133** and **1134** are portions that receive the rotational driving force from the second output joint **62**.

In the present embodiment, as shown in FIG. **23**B, one projection piece **1131** is longer in the projection direction of the projection shaft **1112** than the other projection piece **1132**. With this configuration, during the attachment process of the toner container **3**M to the attachment portion **58**, even if the toner container **3**M is moved toward the attachment portion **58** in an inclined state, the second input portion **111**

is smoothly coupled with the second output joint **62** in a reliable manner. That is, as shown in FIG. **24**A, when the second input portion **111** approaches the second output joint **62**, first the projection piece **1131**, the longer projection piece, enters the gap **628**. At this time, if the projection piece **1131** contacts a portion other than the gap **628**, such as the first inclined surface **625**, the projection piece **1131** is guided to the gap **628** by the first inclined surface **625**. In addition, if the projection piece **1131** contacts the second inclined surface **627**, the projection piece **1131** is guided to the gap **628** by the second inclined surface **627**. At this time, the projection piece **1132**, the shorter projection piece, is not contacting any engaging piece **623**. Thus, the guidance of the projection piece **1131** to the gap **628** is not interrupted by the projection piece **1132**. When the projection piece **1131** contacts and is guided by the first inclined surface **625** or the second inclined surface **627**, the second input portion **111** pivots around the axis, and the shorter projection piece **1132** is disposed at a position to face the gap **628**. As shown in FIG. **24**B, when the second input portion **111** further approaches the second output joint **62**, the shorter projection piece **1132** enters the gap **628**.

Here, FIG. **25**A is a perspective view of a second input portion **111**A having a conventional configuration, and FIG. **25**B is a perspective view of a second output joint **62**A having a conventional configuration. In addition, FIG. **26** is a plan view of the second output joint **62**A having a conventional configuration. In these drawings, components that are the same as those of the present embodiment are assigned the same reference signs. The conventional second input portion **111**A shown in FIG. **25**A includes two projection pieces **113**, but these projection pieces **113** have the same length. As a result, when the toner container **3**M is moved toward the attachment portion **58** in an inclined state, one front end **113**A (a portion represented by a dotted line in FIG. **26**) of the two projection pieces **113** enters the gap **628**, but the other front end **113**B (a portion represented by a dotted line in FIG. **26**) may be caught by the front end of the first inclined surface **625**. However, according to the present embodiment, such a catching does not occur, and thus, when the toner container **3**M is attached to the attachment portion **58**, the second input portion **111** is coupled with the second output joint **62** in a reliable manner.

As described above, in the present embodiment, the central flange **832** is provided so as to couple the upper case **78** of the upper storage portion **71** with the lower case **79** of the lower storage portion **72**. As a result, even if, due to a production error or the like, the first input portion **98** and the second input portion **111** are positionally deviated, or the first output joint **61** and the second output joint **62** are positionally deviated, the toner container **3**M can be bent at the vicinity of the gap **88** when the toner container **3**M is attached to the attachment portion **58**, so that the first input portion **98** is aligned with the first output joint **61**, and the second input portion **111** is aligned with the second output joint **62** for positioning. This allows the first input portion **98** to be coupled with the first output joint **61**, and the second input portion **111** to be coupled with the second output joint **62**, smoothly in a reliable manner. In addition, in a case where the rotational driving force is transmitted in the state where the toner container **3**M is attached to the attachment portion **58**, even if, due to a positional deviation, a load is applied to the input portions **98** and **111** or the output joints **61** and **62**, the load escapes toward the central flange **832** and bends the toner container **3**M at the vicinity of the gap **88**. With this configuration, it is possible to distribute the load of the input portions **98** and **111** or the output joints **61** and **62** and prevent the input portions **98** and **111** or the output joints **61** and **62** from being damaged.

As shown in FIG. **8**, the first conveyance portion **92** and the second conveyance portion **105** are separated from each other in the width direction D**12**. Specifically, the first conveyance portion **92** is provided on the wall surface **781** of the upper storage portion **71** at a position close to a side portion on one side (the front side) in the width direction D**12**. In addition, the second conveyance portion **105** is provided on the wall surface **791** of the lower storage portion **72** at a position close to a side portion on the opposite side (the rear side) in the width direction D**12**.

As shown in FIG. **7** and FIG. **9**, the toner container **3**M includes a gripping portion **122** having a concave portion **123**. The gripping portion **122** is a portion that is gripped by the user when the user carries or performs a replacement of the toner container **3**M. In the present embodiment, the concave portion **123** is formed in one side of the container main body **75** in the width direction D**12**. More specifically, the concave portion **123** is formed between the upper storage portion **71** and the lower storage portion **72** in a side portion on the front side while the toner container **3**M is in an attachment attitude of being attached to the attachment portion **58**. The concave portion **123** passes through the toner container **3**M in the depth direction D**13**, and when the toner container **3**M is viewed from the lid member **76** side, the concave portion **123** is rectangular. With the formation of the concave portion **123**, the toner container **3**M has the gripping portion **122** that is a narrowed, constricted portion. Since, the gripping portion **122** is formed in a constricted shape so as to be easily held by the user, the user can easily place his/her fingers on the gripping portion **122**, easily carry the toner container **3**M, and easily perform the replacement work. It is noted that since the lid member **76** is formed in the shape that matches the shape of the container main body **75**, the lid member **76** also has a constricted portion in correspondence with the gripping portion **122**.

It is noted that as shown in FIG. **5**, in the toner container **3**K, the concave portion **123** is formed in each of the side portions on opposite sides in the width direction D**12**.

As shown in FIG. **7**, the concave portion **123** is provided in an upper portion of the lower storage portion **72**. As a result, under the constraint that the toner container **3**M cannot be increased in size, the presence of the concave portion **123** reduces the capacity of the storage space **86** of the lower storage portion **72**. However, since the lower storage portion **72** is configured to store waste toner, the upper space of the storage space **86** is never filled until the storage space **86** is filled with the waste toner. For this reason, the concave portion **123** is preferably formed in the lower storage portion **72**. The upper storage portion **71** is configured to store unused toner. As a result, if the concave portion **123** is formed in the upper storage portion **71**, the storage space **85** of the upper storage portion **71** cannot secure a prescribed capacity required to store the unused toner. Thus it is not preferable to form the concave portion **123** in the upper storage portion **71**.

In addition, the concave portion **123** is formed in proximity to the first conveyance portion **92**, more specifically, directly under the shutter member **101** of the first conveyance portion **92**. When the toner container **3**M is attached to or detached from the attachment portion **58**, the shutter member **101** is opened or closed, and the opening or closing of the shutter member **101** generates a sliding resistance. When performing a replacement work of the toner container **3**M, the user feels the sliding resistance as a load. However, the concave portion **123** is provided directly under the

shutter member **101**. Thus, when performing a replacement work of replacing the toner container **3**M by gripping the gripping portion **122**, the user can easily apply a force to the gripping portion **122**, and can directly transmit a force to the shutter member **101**. With this configuration, the workability during the replacement work is improved.

As shown in FIG. **5** and FIG. **9**, the toner container **3**M includes an identification label **126** that indicates the type of the toner container **3**M (for example, the color of the toner, model number or the like). The identification label **126** is a sheet-like member whose rear side is coated with an adhesive such as paste, and characters and/or symbols indicating the type are written on the front side thereof. The identification label **126** is stuck to the surface of the lid member **76**. Specifically, the identification label **126** is stuck to a region in an outer surface of the lid member **76** that corresponds to the gripping portion **122**. According to conventional toner containers, the container main body **75** or the lid member **76** of the toner container **3**M is colored to the color of the toner stored therein so that the type thereof can be identified. On the other hand, in the present embodiment, the identification label **126** is used to make the toner container **3** identifiable. This makes it possible to unify the toner containers **3** for color printing.

As shown in FIG. **12**, an IC substrate **64** is mounted on an upper portion of the wall surface **781** of the upper case **78**, wherein the IC substrate **64** includes a plurality of contact terminals **67**. The upper portion of the wall surface **781** includes a concave recess portion **783** that is recessed from the wall surface **781** by one stage. Specifically, the concave recess portion **783** is formed on the wall surface **781** to continue to the upper end of the wall surface **781**. The concave recess portion **783** is lower than the wall surface **781** by one stage. The concave recess portion **783** is formed to extend over the whole region of the upper portion of the wall surface **781** in the width direction D**12**. The IC substrate **64** is disposed on the concave recess portion **783**. More specifically, the IC substrate **64** is disposed at the center of the concave recess portion **783** in the width direction D**12**.

It is to be understood that the embodiments herein are illustrative and not restrictive, since the scope of the disclosure is defined by the appended claims rather than by the description preceding them, and all changes that fall within metes and bounds of the claims, or equivalence of such metes and bounds thereof are therefore intended to be embraced by the claims.

The invention claimed is:

1. A toner container that is attachable to an attachment portion included in an image forming apparatus and is inserted into the attachment portion along an attachment direction perpendicular to the attachment portion, the toner container comprising:

a container main body configured to store toner in an inside thereof and elongated in an up-down direction while the toner container is in an attachment attitude of being attached to the attachment portion;

a first conveyance member rotatably provided in the container main body in such a way as to be perpendicular to a longitudinal direction of the container main body and extend in the attachment direction while the toner container is in the attachment attitude, and configured to convey the toner in the container main body;

a first bearing hole provided in the container main body and rotatably supporting a rotation shaft of the first conveyance member in a state where the rotation shaft of the first conveyance member passes through the first bearing hole and extends out of a facing surface that faces the attachment portion while the toner container is in the attachment attitude; and

a first input joint provided on an end portion of a rotation shaft of the first conveyance member in the attachment portion side, and configured to, upon being coupled with a first drive coupling portion of the attachment portion, receive, from the first drive coupling portion, a driving force that causes the first conveyance member to rotate, wherein

the first drive coupling portion includes a base portion and a plurality of engaging pieces, the base portion having a shaft hole, the engaging pieces projecting from the base portion toward the facing surface of the container main body and being disposed around the shaft hole,

the first input joint includes a projection shaft and a plurality of projection pieces, the projection shaft being configured to be inserted through the shaft hole, the plurality of projection pieces being disposed around the projection shaft and configured to be respectively coupled with the plurality of engaging pieces while the toner container is in the attachment attitude,

among the plurality of projection pieces, at least one first piece is longer than the other second piece(s) in a projection direction of the projection shaft,

the container main body includes:

a first toner storage portion configured to store unused toner in an inside thereof and provided in an upper part of the container main body while the toner container is in the attachment attitude; and

a second toner storage portion configured to store, in an inside thereof, used toner collected from the image forming apparatus, and is provided in a lower part of the container main body below the first toner storage portion while the toner container is in the attachment attitude,

the toner container further comprises:

a second conveyance member rotatably provided in the first toner storage portion in such a way as to extend in the attachment direction, and configured to, by being rotated, convey the unused toner stored in the first toner storage portion toward the attachment portion;

a second bearing hole provided in the first toner storage portion and rotatably supporting a rotation shaft of the second conveyance member in a state where the rotation shaft of the second conveyance member passes through the second bearing hole and extends out of the facing surface that faces the attachment portion while the toner container is in the attachment attitude; and

a second input joint provided on an end portion of the rotation shaft of the second conveyance member in the attachment portion side, and configured to, upon being coupled with a second drive coupling portion of the attachment portion, receive, from the second drive coupling portion, a driving force that causes the second conveyance member to rotate, and

the first conveyance member is provided in the second toner storage portion and configured to convey the used toner to an inside of the second toner storage portion by being rotated.

2. The toner container according to claim **1**, wherein

each of the plurality of engaging pieces includes a first inclined surface and a perpendicular surface, the first inclined surface being inclined from a projection end of that engaging piece toward the base portion, the perpendicular surface being formed on an opposite side to

the first inclined surface across the projection end and perpendicular to the base portion,

a projection end of each of the at least one first piece and the other second piece(s) is formed in a tapered shape,

the at least one first piece includes a first abutting surface configured to contact a perpendicular surface of at least one first engaging piece among the plurality of engaging pieces, and

the second piece(s) respectively include second abutting surface(s) configured to contact perpendicular surface (s) of the other second engaging piece(s) among the plurality of engaging pieces.

3. The toner container according to claim **2**, wherein

a projection end of each of the plurality of engaging pieces is formed in a tapered shape, and each of the plurality of engaging pieces includes, at a corner portion between the first inclined surface and the perpendicular surface, a second inclined surface that is inclined with respect to both the first inclined surface and the perpendicular surface.

4. The toner container according to claim **1**, wherein

the second input joint is an engaging portion that is inserted in a rectangular engagement hole formed in the second drive coupling portion and is engaged with the second drive coupling portion in a circumferential direction of the rotation shaft of the second conveyance member.

5. The toner container according to claim **1**, wherein

a first housing of the first toner storage portion includes a cylindrical first guide portion extending outward from the facing surface, the second conveyance member extends from an inside of the first housing to an inside of the first guide portion, and the second input joint is exposed to outside from an end portion of the first guide portion in the attachment portion side, and

a second housing of the second toner storage portion includes a cylindrical second guide portion extending outward from the facing surface, the first conveyance member extends from an inside of the second housing to an inside of the second guide portion, and the first input joint is exposed to outside from an end portion of the second guide portion in the attachment portion side.

6. An image forming apparatus comprising:

an apparatus main body including an attachment portion; and

a toner container that is attachable to the attachment portion and is inserted into the attachment portion along an attachment direction perpendicular to the attachment portion, wherein

the toner container includes:

a container main body configured to store toner in an inside thereof and elongated in an up-down direction while the toner container is in an attachment attitude of being attached to the attachment portion;

a first conveyance member rotatably provided in the container main body in such a way as to be perpendicular to a longitudinal direction of the container main body and extend in the attachment direction while the toner container is in the attachment attitude, and configured to convey the toner in the container main body;

a bearing hole provided in the container main body and rotatably supporting a rotation shaft of the first conveyance member in a state where the rotation shaft of the first conveyance member passes through the bearing hole and extends out of a facing surface that faces the attachment portion while the toner container is in the attachment attitude; and

a first input joint provided on an end portion of a rotation shaft of the first conveyance member in the attachment portion side, and configured to receive a driving force that causes the first conveyance member to rotate,

the attachment portion includes a first drive coupling portion configured to be coupled with the first input joint and input the driving force to the first input joint while the toner container is in the attachment attitude,

the first drive coupling portion includes a base portion and a plurality of engaging pieces, the base portion having a shaft hole, the engaging pieces projecting from the base portion toward the facing surface of the container main body and being disposed around the shaft hole,

the first input joint includes a projection shaft and a plurality of projection pieces, the projection shaft being configured to be inserted through the shaft hole, the plurality of projection pieces being disposed around the projection shaft and configured to be respectively coupled with the plurality of engaging pieces while the toner container is in the attachment attitude,

among the plurality of projection pieces, at least one first piece is longer than the other second piece(s) in a projection direction of the projection shaft,

the container main body includes:

a first toner storage portion configured to store unused toner in an inside thereof and provided in an upper part of the container main body while the toner container is in the attachment attitude; and

a second toner storage portion configured to store, in an inside thereof, used toner collected from the image forming apparatus, and is provided in a lower part of the container main body below the first toner storage portion while the toner container is in the attachment attitude,

the toner container further comprises:

a second conveyance member rotatably provided in the first toner storage portion in such a way as to extend in the attachment direction, and configured to, by being rotated, convey the unused toner stored in the first toner storage portion toward the attachment portion;

a second bearing hole provided in the first toner storage portion and rotatably supporting a rotation shaft of the second conveyance member in a state where the rotation shaft of the second conveyance member passes through the second bearing hole and extends out of the facing surface that faces the attachment portion while the toner container is in the attachment attitude; and

a second input joint provided on an end portion of the rotation shaft of the second conveyance member in the attachment portion side, and configured to, upon being coupled with a second drive coupling portion of the attachment portion, receive, from the second drive coupling portion, a driving force that causes the second conveyance member to rotate, and

the first conveyance member is provided in the second toner storage portion and configured to convey the used toner to an inside of the second toner storage portion by being rotated.

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